EXPANDED SITE INVESTIGATION

DEAD CREEK PROJECT SITES

AT CAHOKIA/SAUGET, ILLINOIS

FINAL REPORT

VOLUME 2 OF 2

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#### I. INTRODUCTION

The RI portion of the Dead Creek Project Remedial Investigation/Feasibility Study, as described in the Project Work Plan, includes eleven tasks to be completed. Task 5, Description of Current Situation, calls for Ecology and Environment, Inc. to prepare a description of the background information pertinent to the area and its problems and outline the purpose and need for remedial investigation in the area.

This report was prepared to provide the information on and a description of the current situation of the sites in the Dead Creek Project area. The report is organized to provide an area wide description followed by a detailed site by site description. The site by site description provides a detailed presentation of all available information concerning each site, which was acquired and evaluated during Tasks 3 and 4 of the RI.

#### II. GENERAL DESCRIPTION OF PROJECT AREA

#### Location

The Dead Creek Project area is located in and around the cities of Sauget (formerly Monsanto) and Cahokia in St. Clair County, Illinois (Figure 1). Under the scope of the RFP issued by the IEPA, the study area consists of 18 suspected uncontrolled hazardous waste sites located throughout the study area (Figure 2). The project area consists of 12 individual sites and 6 additional sectors in Dead Creek.

#### Areal Description and Topography

The sites to be investigated as part of the Dead Creek Project are in an area which contains a mixture of industrial, residential, commercial, farm, and undeveloped land. The sites consist of closed and active landfills, industrial property, undeveloped or currently unutilized land, residential land, and an areal drainage flowpath (Dead Creek).

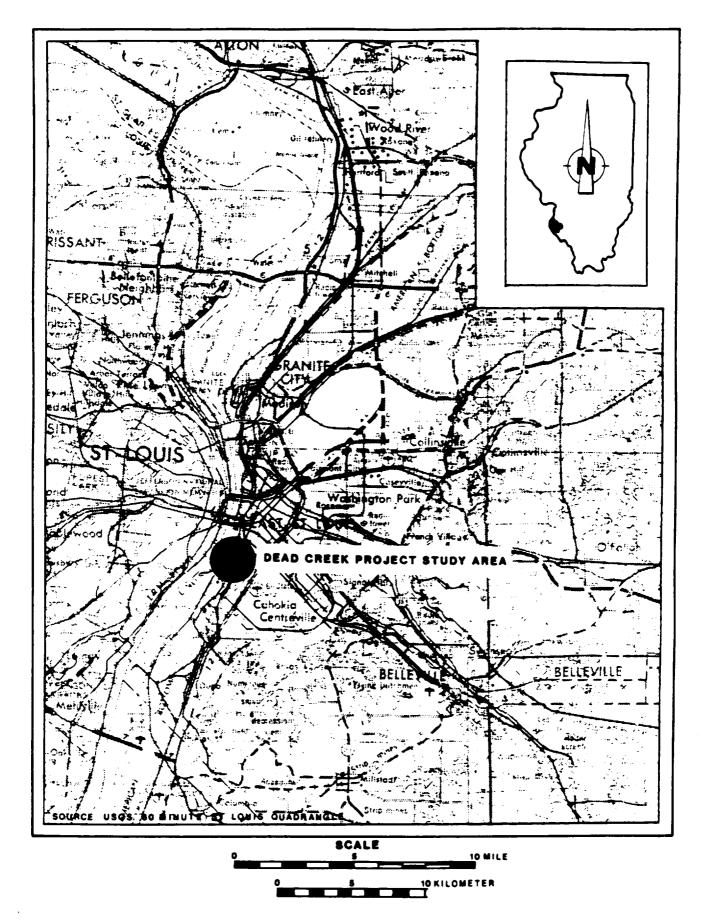


FIGURE 1
DEAD CREEK PROJECT SITE LOCATION MAP

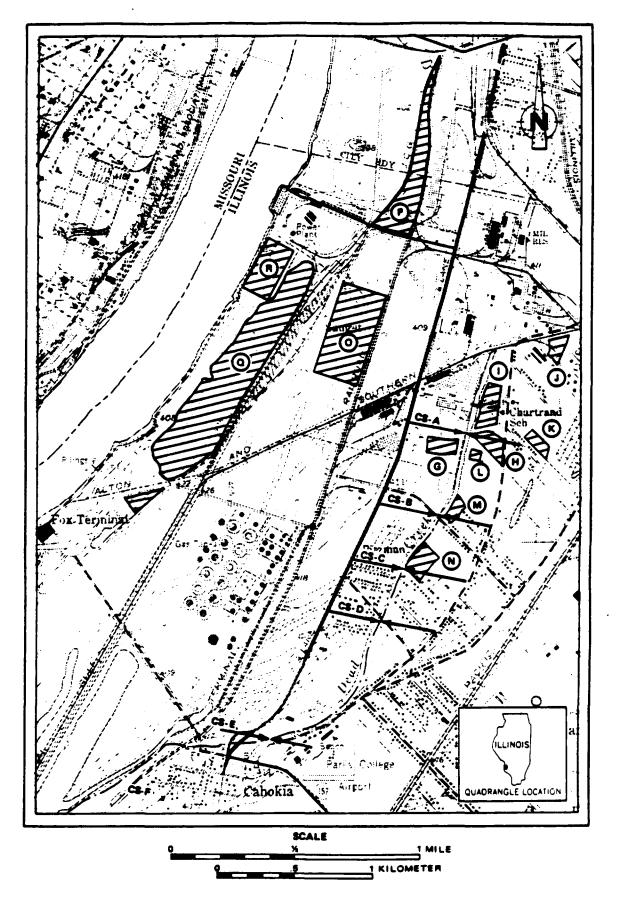


FIGURE 2
SITE REPORTING DESIGNATIONS FOR THE DEAD CREEK PROJECT

The project area is situated within the floodplain of the Mississippi River in an area known locally as the American Bottoms. Topography in the site area is controlled by structural features of the bedrock which resulted from glacial and fluvial occurrences. The Mississippi River meandered over the American Bottoms floodplain between the upland bluffs, which form the floodplain boundaries, prior to the establishment of the present channel. The meadering of the river has given rise to typical floodplain characteristics throughout the study These features include low, broad, flat, swampy areas; terraces (generally found north of the study are); curved ridges and swales (typified as meander scars) formed as slack water bars or channels; alluvial fans; wetlands vegetation (although all vegetation is generally sparse due to industrialization and urbanization); mounds; and crescent shaped ox-bow lakes. The shifting of the Mississippi River channel has resulted in heterogeneous interbedding. of fine and coarser material in the surficial flood plain deposits. Material has also been transported to the flood plain from the uplands and from the bluffs by overland flow which has resulted from rainstorms.

As in the case of most flood plains, the American Bottoms area is not perfectly flat. Many slight, naturally occurring and manmade, irregularities exist. However, in general the land surface at the site area is 400 feet above mean sea level. The land generally slopes from north to south and from the east toward the river. The wide floodplain area (approximately 6.5 miles across in the site area) exhibits little topographic relief except in the adjacent bluffs and upland areas which tend to be high (up to 150 feet above floodplain levels), steep, and moderately well drained. The local average land scope in the site area is 0.06% to the west. Regional floodplain slope is 0.0059% to 0.009% to the south (Fenneman, 1909; Jacobs, 1971).

Topographic maps for the study area were developed as part of Task 3 of the Remedial Investigation. The topographic maps are included as an attachment to this report, and an Index Map, Figure 3, depicts the

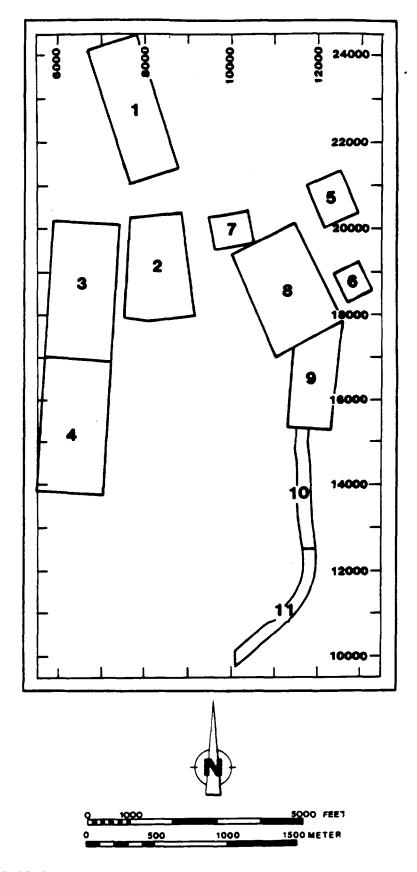


FIGURE 3
BOUNDARIES OF ENGINEERING PLATES FOR THE DEAD CREEK SITES

areal relationships of the topographic maps.

#### Climate

The climate in the site area is generally described as continental with hot, humid summers and mild winters punctuated by extremely cold periods of short duration. The site area is located in a major frontal convergence zone where warm, moist air from the Gulf of Mexico meets cold, dry air from Canada. This convergence zone produces a variety of rapid changes in weather conditions.

The 80-year average precipitation reported by Keefe (1983) was 35.4 inches per year, although the yearly average over the last 25 years (same data base) was up slightly to 39.5 inches per year. June is normally the wettest month, with an average of 4.3 inches of rain. Much of the summer rainfall is produced by thunderstorms, which are also responsible for the unusually heavy rains which periodically cause isolated flooding. Rainstorms which produce 1 to 2 inches of precipitation are common. Relative humidity typically ranges between 50 and 60 percent during the summer. Snow can occur in any and all months from November through April. Annual snowfall averages 17 inches.

The regional average annual temperature is 56° F. (Fahrenheit) with a January mean of 32° F. and a July mean of 79° F.. Periodic polar air fronts move through the area during the winter producing lows of -10 to-15 degrees Fahrenheit. July and August are typically hot and humid, producing temperatures above 90° F. on an average of 22 days/year. Highs in excess of 100° F. generally occur for short periods of 3 to 5 days.

#### Geology

The geologic formations present in the site study area consist of unconsolidated alluvium and glacial outwash, which are underlain by Mississippian and other bedrock layers. These bedrock layers are

underlain by basement granitic crystalline rock. The geologic formation sequence for South-Central Illinois is represented in Figure 4. The study area, the American Bottoms, and the Mississippi River channels are all located in a broad deep cut bedrock valley. The bedrock valley is delineated by bluff lines on both sides. Based upon available data, the bedrock valley has steep walls along the bluff lines while the valley bottom slopes gently toward the middle.

Within the bedrock valley, the Mississippi River has provided the primary mechanisms controlling the recent formation of geology and Bergstrom, et al (1956) suggests that the bedrock valley is pre-glacial in nature; however, Willman et concludes that insufficient data exists to suggest a pre-glacial valley structure for the Mississippi River. Nevertheless, glaciation did significantly modify and redesign the Mississippi River and its valley through both glacial and interglacial periods. These changes occurred as glacial wasting caused massive amounts of meltwater to be directed generally southward through and around bedrock and ice contacts, ultimately discharging into the Gulf of Mexico. geologic history, a wide and deep valley (2 to 8 miles across and up to 170 feet deep) has been carved into the predominantly soft sedimentary bedrock underlying the river (Bergstrom, 1956). Changes in stream flow, direction, and sediment load have caused this valley to fill with secondary alluvial sediments. These constantly changing parameters have resulted in the river continuously picking up and depositing (and cutting and filling) its sediment base, thereby directing and redirecting the river and its channels throughout time.

The unconsolidated valley fill, present in the bedrock valley, ranges in thickness from approximately 70 to 120 feet in the study area. The thickness of the valley fill in the region of the study area is depicted in Figure 5. A cross section of the valley fill in the vicinity of the study area is presented in Figure 6.

The valley fill deposits are typically comprised of two main formations which may reach as deep as 120 feet in the site area. The Cahokia, the uppermost formation, is comprised of predominantly silt,

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FIGURE 4
GENERALIZED GEOLOGIC COLUMN FOR SOUTH-CENTRAL ILLINOIS

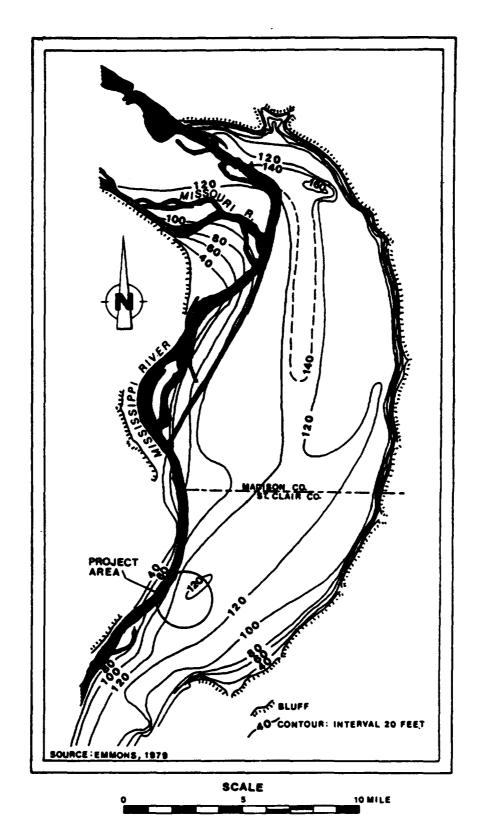
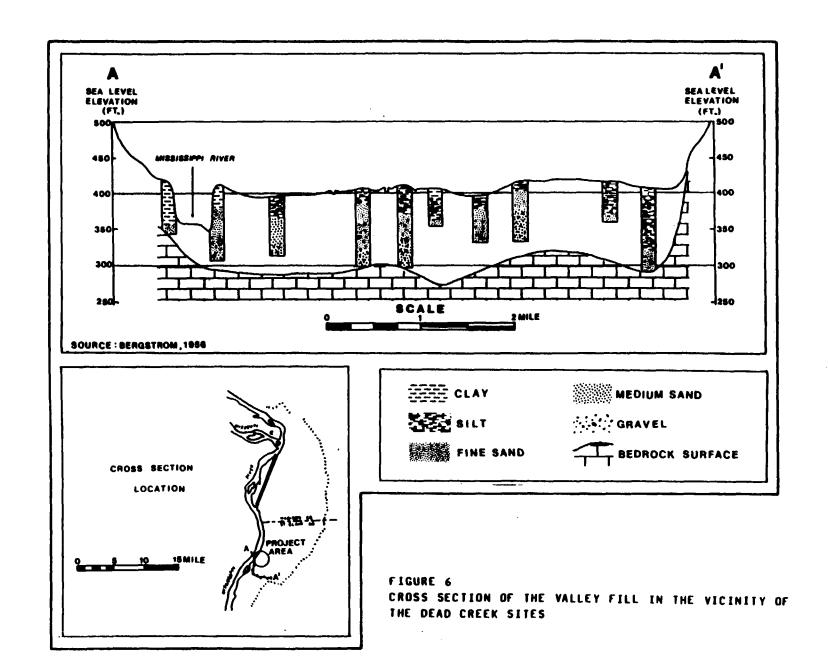


FIGURE 5
THICKNESS OF THE UNCONSOLIDATED VALLEY FILL IN THE
DEAD CREEK STUDY AREA



clay, and fine sand deposits generally indicative of an aggrading environment. These deposits were laid down as flood events of the Mississippi River, eolian activity, bank slumping, erosion, and/or slugs of material deposited directly by tributary streams. This formation has been frequently reworked by the Mississippi River and typically consists of coarser material intertongued with finer grained deposits. As such, these deposits can be variable in thickness (ranging from 15 to 30 feet). Larger expressions of tributary deposits may form thicker alluvial fans where high energy streams dissipated and dropped their sediment load.

The second major formation of the floodplain setting is the Mackinaw Member of the Henry Formation. This formation underlies the Cahokia Alluvium, and is comprised of sand and gravel from glacial outwash. Within the study area, this material rests directly on the bedrock surface and can be highly variable in thickness (70 to 100 feet) due to the fluvial processes which formed it. This formation typically contains portions which are complexly interbedded due to meandering of the river throughout history.

A third minor formation noted locally within the floodplain, but not discovered within the site investigation area, is the Peyton Colluvium. This material is comprised of fine grained silt (loess) and clay (till) which has slumped from upland areas and accumulated at the base of steep bluffs.

Immediately adjacent to the floodplain (and 3.5 to 5 miles east-south east of the sites) is an upland area marked by a steep (50 to 150 feet above surrounding terrain) bluff. Structurally, these upland areas are based unconformably on bedrock (which has not been eroded as deeply as the adjacent valley), and consists of 10 to 100 feet of uncolsolidated sediments of predominantly glacial origin. No upland formations exist in the study area; however, erosion and slumping of the upland has provided the parent material for the Cahokia Formation and Peyton Colluvium, which are found in the floodplain.

The entire study area is underlain by relatively soft sedimentary rock layers. Typically, these rocks consist of shale, limestone, sandstone, and dolomite, which were formed through geologic time by lithification of sediment and sediment-like materials. In general, parent materials were disintegrated into sand, silt, clay, and mud, which were then deposited sequentially by sedimentary processes, such as precipitation and erosion. These sequential deposits (formations) were ultimately lithified by compression, compaction, reclystallization, and cementation. General depositional environments included shallow and deep seas, rivers, and swamps. These environments provided varying thicknesses of similar materials. Missing sequences apparently represent unconformities caused by terrestrial or near terrestrial erosional processes. These sedimentary rock sequences represent millions of years of geologic time.

The earliest sedimentary rock overlying the granite basement rock is Cambrian age sandstone limestone, dolomite, and shale. The Ordovician system overlies the Cambrian. Its formations consist of sandstone, dolomite, limestone and shale. Overlying the Ordovician is the Silurian System consisting of numerous limestone layers. Next youngest is the Devonian System, with limestone, sandstone, and shale formations. At the top of the sequence is the Mississippian System containing numerous limestone, shale, siltstone, dolomite, and sandstone layers. In the adjacent highlands and at one bedrock high located within the valley south of the site area, the Pennsylvanian System may be found to contain various sandstones, siltstones, and shale formations.

Bedrock structure in the area appears to be controlled by a significant fold (the Waterloo anticline) and fluvial erosion (primarily by the Mississippi River). The fold is centered approximately 6 miles south of the site area, and the structure trends north-northwest. This fold has bent the overlying rock in the area, producing a gentle northeast-east dip of up to 3 percent on the bedrock strata. This allows the deep strata to be exposed by bedrock

valley erosional processes to the southwest of the study area, while maintaining these same formations at a deeper elevation to the northeast of the study area.

#### Hydrology

The description of the hydrology of the study area is divided into the surface drainage and groundwater discussions presented below.

#### Surface Drainage

The Mississippi River extends far to the north and south of the site area and drains the American Bottoms and the tributary upland Although the Mississippi River floodplain is subject to periodic inundation by excess water runoff, most of the area is protected from massive regional flooding by a complex series of levees and other flood control structures. This condition partially adds to local small scale flooding problems since precipitation is trapped behind the flood control structures where drainage is typically poor. Dead Creek itself provides drainage for a portion of the American Bottoms, and ultimately discharges to the Mississippi River via the Prairie DuPont Floodway and Cahokia Chute. (1909) has suggested that Dead Creek may at one time have been a southward extension of Cahokia Creek. Excessive siltation, realignment of surface drainage, or stream piracy may have redirected Cahokia Creek to its present channel, thus cutting off Dead Creek from the original source water.

Major surface drainage in the area is also provided by Cahokia Creek (to the north) and the Old Prairie DuPont Creek (to the south). Both of these creeks channel surface water directly into the Mississippi River. Significant additional secondary drainage within the site area and floodplain is provided by an extensive system of storm drains, pumping stations, and ditches, which were constructed or modified from existing natural drainage features for this purpose.

#### Groundwater

Groundwater exists in both the unconsolidated valley fill and the underlying bedrock formations. The Mississippian bedrock limestone and sandstone are water-bearing formations. Where these formations are located immediately below the unconsolidated material, there is sufficient groundwater for small or medium users. However, because of the abundance of groundwater present in the valley fill sand and gravel, the bedrock aquifer is of little significance to the study area. The majority of available groundwater in the study area is present in, and taken from, the valley fill materials. The Illinois State Water Survey has identified the study area as one in which the chances of obtaining a well yielding 500 gpm or more are good. The coarsest deposits, which are most favorable for water development, are commonly encountered near bedrock and generally average 30 to 40 feet in thickness. However, because of the alluvial nature of deposits in the study area, sand and gravel deposits which yield significant quantities of groundwater are commonly found in the study area nearer the ground surface.

Prior to development of the area, groundwater levels within the study area were very near the surface elevation of 400 ft MSL. As a result, ponds, swamps, and poorly drained areas were prevalent. The development of the area led to the construction of levees, drainage ditches, and wells, all of which caused the lowering of the groundwater levels. In the early 1960's, the extensive industrial pumpage in the study area (over 30 million gallons per day) resulted in a lowering of the water table by as much as 50 feet. However, due in part to the decrease in industrial groundwater use, groundwater levels within the study area have sustained a significant rise since the Mississippi River floods of 1973. Groundwater withdrawal within all of St. Clair County, in 1980, only amounted to 16 million gallons As a result, measurements of monitoring wells near Dead Creek identified the water table at approximately 393 feet MSL (about 15 ft. below ground surface) in January 1981. Groundwater levels near other portions of the study area are expected to be similarly

depressed below ground surface except where affected by surface structure or well pumpage. Groundwater levels are affected by flood stages of the Mississippi River, and undergo water-level fluctuations as a result of seasonal weather patterns. In areas remote from major pumping centers, water levels generally recede in late spring, summer and early fall, when discharge from the groundwater reservoir by evapotranspiration, groundwater run-off to streams, and pumping from wells is greater than recharge. Recovery of water levels generally occurs in the early winter when conditions are favorable for infiltration of rainfall to the water table. Water level recovery is especially pronounced during the spring when the groundwater reservoir receives most of its annual recharge. Water levels are generally highest in May and lowest in December. Water levels remote from major pumping centers have a seasonal fluctuation ranging from 1 to 13 feet, with an average fluctuation of about 4 feet.

Based upon the surface drainage system for the region in 1900, R.J. Schicht (Illinois State Water Survey, 1965) estimated the piezometric surface prior to heavy development in the area. Groundwater elevation was estimated to be about 420 feet near the bluffs to about 400 feet near the Mississippi River. The piezometric surface had an average slope of about 3 feet per mile and ranged from 6 feet per mile in the Alton area to the north, to one foot per mile in the Dupo area to the south. The slope of the piezometric surface was greatest near the bluffs and flatest near the Mississippi River. Groundwater movement was generally directed to the west and south toward the Mississippi River and other streams and lakes.

Groundwater movement in the shallow deposits throughout the study area generally follow the land surface topography, with lateral movement toward local discharge zones (wells and small streams), and some movement into the deeper unconsolidated aquifers. Groundwater in the deeper unconsolidated deposits generally follows the bedrock surface. Accordingly, groundwater generally flows downstream through the sand and gravel aquifers in much the same direction as the original streamflow, but at a much slower rate.

In 1962, the general pattern of groundwater flow was slow movement from all directions toward the cones of depression, which had formed due to heavy pumpage, or toward the Mississippi River and other streams. In the study area, the lowering of the water table that accompanied groundwater withdrawal in the area established hydraulic gradients from the Mississippi River towards the pumping centers. In portions of the study area, groundwater levels were below the surface of the river and appreciable quantities of water were diverted from the river into the aquifer by the process of induced infiltration. Within the study area, the slope of the piezometric surface near the cone of depression, produced by pumping at the Monsanto facilities, exceeded 30 feet per mile.

The principal hydraulic properties of the valley fill and alluvium present in the study area indicate that the materials readily transmit groundwater and have a large amount of groundwater storage capacity. In 1952, tests were conducted for the Monsanto Chemical Corporation to evaluate the hydraulic properties of the deposits. The upper 40 feet of unconsolidated materials in the area consisted of sandy clay, and the lower 80 feet of unconsolidated material in the area consisted of various layers of sand and sand and gravel. A pump test was conducted on a well located 515 feet east of the Mississippi River and drilled to a depth of 99 feet. Six observation wells were used to assess the pump test. Using the time-drawdown method of analysis, the coefficient of transmissivity was determined to be 210,000 gpd/ft. The coefficient of storage was determined to be 0.082 ( $ft^3/ft^3$ ), which is in the range typical of water table conditions. The coefficient of permeability was determined to be  $2800 \text{ apd/ft}^2$ .

Recharge of groundwater in the study area is received from direct infiltration of precipitation and run-off, subsurface flow of infiltrated precipitation from the bluff area to the east, and induced infiltration from adjacent river beds, where pumpage has lowered the water table below the level of the river. Direct

recharge of the water table only captures a portion of the annual A major portion of the precipitation runs-off to precipitation. streams or is lost by the evapotransporation process before it reaches the aguifer. Nevertheless, precipitation is probably the most important recharge source for the study area as a whole. amount of surface recharge that reaches the saturation zone depends upon many factors, including the character of the soil and other materials above the water table, the topography, vegetal cover, land use, soil moisture, depth to the water table, the intensity and seasonal distribution of precipitation, and temperature. Because of the low relief and limited runoff in the study area, and because the upper silt and clay fill is not so impermeable as to prevent appreciable recharge, most of the precipitation either evaporates or seeps into the soil. Because of the extensive flood-control network in the area, recharge from floodwaters provides a limited input to Based upon a modified form of the Darcy equation, R.J. the area. Schicht (1965) calculated the average rate of surface recharge to be about 371,000 gpd/sq. mi. for the study area.

Regional groundwater flow components to the west and south provide subsurface recharge to the study area. Schicht similarly estimated that the average recharge from subsurface flow of water from the eastern bluff boundary is 329,000 gpd/mi.

The lowering of the water table as a result of groundwater withdrawals in the study area has, in the past, established a hydraulic gradient from the Mississippi River toward the pumping centers. This resulted in water percolation through the river bed and into the aquifer, producing induced infiltration recharge. Schicht estimated the 1961 induced infiltration recharge volume for the study area to be approximately 18.5 million gpd, or roughly 58%, of the 31.9 million gpd total being withdrawn. Water withdrawal data from 1980 for the study area and areas to the north indicate that total withdrawals amount to only 3.9 million gpd as compared to more than 42 million gpd in 1961. Accordingly, for the study area, the amount of current induced infiltration from the Mississippi is

believed to be small due to dramatically reduced groundwater usage. Although current, detailed data for public and industrial water supply wells in the study area is presently unavailable, 1980 Illinois State Water Survey data indicated the presence of ten wells in or generally near the study area.

The chemical character of groundwater found in the study area varies geographically and with depth. Pumping rates and surface activities may also influence local quality. Generally, shallow wells (less than 50 feet deep) are quite highly mineralized and may have a high chloride content. Groundwater in heavily pumped areas often has high sulfate and iron contents and elevated hardness values.

Groundwater quality data developed by Schicht (1965) for Township 2N. Range 10W, Section 26, which includes a major portion of the study area, provides historical chemical data for wells with depths of approximately 100 feet. In general, the water quality was consistent. Hardness values ranged from 377 to 777 ppm, chloride values ranged from 9 to 61 ppm, and sulfate values ranged from 137 to 487 ppm. Recent Illinois State Water Survey data developed by Keefe (1983) identified a general increase in chloride and sulfate concentrations for groundwater in the study area. The general increase in chlorides was associated with the use of road salts since increased concentrations correlated with major highway locations. Increases in sulfate concentrations were speculated to be caused by an upward movement of high sulfate water from the bedrock as a result of pumping activities. Decreases in chloride and sulfate contents of groundwater were identified in a section along the Mississippi River where extensive nearby pumping had resulted in induced infiltration from the river.

## III. SITE SPECIFIC DESCRIPTIONS

#### SITE G. ABANDONED LANDFILL

#### Site Description

Site G is a former subsurface/surface disposal area which occupies approximately 4.5 acres in Sauget, Illinois. The site is bordered on the north by Queeny Avenue; on the east by Dead Creek; on the south by a cultivated field; and on the west by Wiese Engineering Company property.

The surface of Site G is littered with demolition debris and metal wastes. Several small pits have been observed in the northeast and east-central portions of the site. Oily and tar-like wastes, along with scattered corroded drums, are found in these areas. Additionally, 20-30 deteriorated drums are scattered along a ridge running east-west, near the southern perimeter of the site. The western portion of Site G is marked by a mounded area with several corroded drums protruding at the surface. A large depression is found immediately south of the mounded area. This depression receives surface runoff from a sizable area within the site. Also, exposed debris is present over most of the site. In areas where wastes are not exposed, flyash and cinder material has been used as cover.

#### Site History and Previous Investigations

Examination of historical aerial photographs indicates excavation at Site G began sometime prior to 1950 and disposal operations were initiated shortly thereafter. No information is available concerning owners or operators for Site G at the time disposal was occurring. The photographs suggest disposal activities at the site continued until the early 1970s. Presently, Site G is inactive, although recent observations suggest that random dumping of various non-chemical wastes continues.

Site G was previously studied by the Illinois EPA in 1980 and 1981 as

part of an area-wide study to determine the source of contamination found in Dead Creek.

The results of this study were reported in the Preliminary Hydrogeological Investigation in the Northern Portion of Dead Creek and Vicinity in 1980-1981 (St. John Report). Locations of samples collected to date in the vicinity of Site G are shown on Figure G-1. The IEPA study completed in 1981 included collecting samples from subsurface soils and groundwater at Site G, and collecting surface water and sediment samples from Dead Creek immediately east of the site. Monitoring well G106 was installed in the northeast corner of the site, and well G107 is located approximately 50 feet south of Site G in a surface depression. In addition, wells G101 and G104 were installed southwest of the site as part of the general area Analytical data for these wells are presented in Tables B-6, B-7, and B-8, located in the Creek Sector B portion of this report. Several organic contaminants were detected at elevated levels in well G107. These include chlorophenol, chlorobenzene, dichlorophenol, dichlorobenzene, and PCBs. PCBs were also detected in samples collected from well G106. Both of these wells showed concentrations of heavy metals; specifically arsenic, barium, copper, lead, and manganese, which exceeded IEPA water quality standards. Phosphorus also exceeded the standards in both wells. Wells G101 and G104 showed little evidence of contamination although trace levels of PCBs were found in G101. Preliminary surveillance in November, 1985 at Site G showed wells G101, G104, and G107 to be intact. Well G106 was not located, and is suspected to have been destroyed.

In order to determine the vertical distribution of contaminants in the area, the IEPA collected subsurface soil samples at the locations of wells G106 and G107. Analytical data from these samples is shown in Table G-1. High levels of metals and phosphorus were detected in all samples. Trace levels of PCBs were found to a depth of 13 feet at G106. A quantified level (0.62 ppm) of PCBs was found at a depth of two feet in the location of G107, but PCBs were not detected in deeper samples. In October, 1984, IEPA collected three soil samples

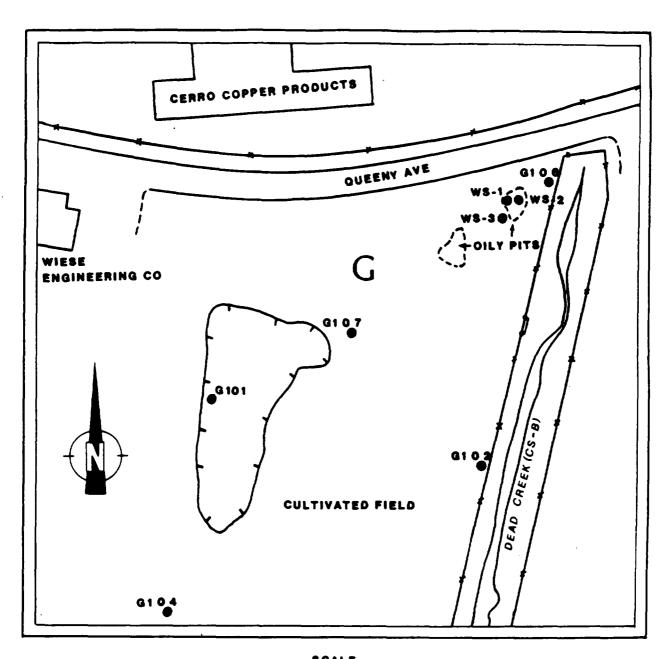




FIGURE G-1
DEAD CREEK SITE AREA G WITH SAMPLE LOCATIONS

TABLE G-1: AMMLYSIS OF SUBSUFFACE SOIL SAMPLES FROM SITE G (COLLECTED BY 1EPA IN 1990)

					<b>S</b>	MPLE LOCATIO	N AND DEPTH	:			:			
			3			!					3	Ø		6107
PARMETER	7.5'-9.0'	10'-11.5'	12.513	15.5'-17'	18'-19.5'	20'-21.5'	30'-31.5'	0.5'-2'	5'-6.5'	10.5'-12'	15.5'-17"	18'-19.5'	20.5'-22'	25.5'-27'
Copper	<b>Q</b> .	S		35	35	<b>8</b> 8	74	<b>5</b> 7	S					
٤	75,600	12,600	00,400	9, 730	13,600	5, 700	4,700	21,200	21,900					
Fed	a	==		6	12	m	•	2	\$					
Nickel	<b>19</b>	7	11	3	ฆ	œ	<b>5</b> 3	æ	R					
Prosphorus	<b>8</b> 4	Ē	<b>8</b>	Œ,	35	£	<u> </u>	1340	3					
Zinc 2	<b>291</b>	S	×A	<b>3</b>	\$	R	•	8	313					
P.CJs.	•	•	•	•	•	•	•	0.62	•					

NOTE: All results in gom
Blants indicate parameter not analyzed
- below detection limits
\* detected but not quantified (trace)

at Site G from a pit in the northeast corner. Analyses of these samples are presented in Table G-2. Elevated levels of heavy métals were found in all samples, as were various organic contaminants. PCBs were detected in sample WS-3, but not in the other two samples. Sample WS-1 showed the highest degree of organic contamination. Organics detected in this sample include dimethyl phenanthrene, phenyl indene, pyrene, trimethyl phenanthrene, and aliphatic hydrocarbons.

Data from additional samples taken adjacent to Site G in Dead Creek are addressed in the narrative for Creek Sector B. Site G may be a source of contamination in Dead Creek; however, since the hydrology in the area is not well-defined, this cannot presently be determined.

A geophysical investigation, including flux-gate magnetometry and electromagnetics (EM), was completed at Site G in December, 1985 as part of the Dead Creek RI/FS project. A survey grid with dimensions of 440 by 600 feet was laid out using a compass and tape measure. Because of the large amount of scrap metal scattered about the surface of Site G, instruments were calibrated in off-site areas. The magnetometer survey was subcontracted to Technos, Inc. of Miami, Florida.

The magnetometer survey at Site G showed that a major magnetic anomaly covers most of the northern portion of the site. Several smaller anomalies were found to the north of the large depression in the southwest corner of Site G. Survey lines run south of the fill area in a cultivated field showed no magnetic anomalies above background conditions. The mounds in the northwest corner of the site showed smaller anomalies at the surface and larger anomalies for deeper readings, indicating significant quantities of buried metals.

An EM survey was done using the same grid as for the magnetometer investigation. Shallow soundings indicated three areas showing relatively high intensity anomalies. These include a 50 feet by 20

TABLE G-2: ANALYSIS OF WASTE SAMPLES FROM OILY PIT AT SITE G (COLLECTED BY IEPA 10-1-84)

SAMPLE NUMBER

· · · · · · · · · · · · · · · · · · ·	<del>                                     </del>	OF WILL HOUSE	`
PARAMETER ANALYZED	WS-1	WS-2	WS-3
Arsenic	0.3	0.6	97
Cadmium	0.1	0.8	16.8
Copper	101.4	509	712
Chromium	24.4	27.2	30
Iron	106	151	6025
Lead.	26.6	52.1	337
Manganese	•	•	9.9
Mercury	0.36	0.46	1.99
Zinc	101.4	339	104,100
Aliphatic Hydrocarbons	19,200	5.23	-
Chlorobenzene	-	0.58	-
Dimethyl phenanthrene	3100	•	-
Phenylindene	320	-	-
Pyrene	610	-	-
Trimethyl Phenanthrene	1400	-	•
PCBs		-	18
Other Organics (not specified)	1200	0.4	4070

NOTE: All results in ppm - indicates below detection limits

feet area in the northeast corner, a 150 feet by 100 feet area in the east-central portion, and the entire mounded area along the west perimeter of the site. Deep soundings (approximately 10 to 15 meters in depth) indicated a significant anomaly covers most of the northern portion of the site. Three negative anomalies were recorded in the center of the fill area, possibly indicating higher, off-scale instrument readings or the presence of significant quantities non-conductive material such as concrete. The EM survey also showed anomalies trending off-site in the northwest corner, indicating the possibility that the actual filled area extends north under Queeny Avenue.

#### Data Assessment and Recommendations

Activities proposed at Site G for the Dead Creek Project include collecting 10 subsurface and 40 surface soil samples, and water samples from IEPA wells located on or near the site. A soil gas monitoring survey is also scheduled for Site G, and will be conducted in conjunction with ambient air monitoring at the site. investigation is necessary to adequately characterize the site and to provide an adequate data base for conducting the feasibility study. Existing monitoring wells in the vicinity of the site need to be refurbished prior to sampling. Additional wells need to be installed around the site to determine if Site G is contributing to groundwater pollution in the area. Additional borings and subsurface sampling (alternatively excavation of test pits and sampling) in anomalous areas encountered during the geophysical study would be needed to provide additional information concerning depth of fill, waste characteristics, and past operation. This additional information will allow more specific evaluation of remedial alternatives. hydrology of Site G in relation to Dead Creek also needs to be assessed to determine if the site is a source of pollution observed in the creek. This assessment would include collecting the following data: (1) Ground water elevations from a minimum of three locations on each side of the creek. (2) Surface water and creek bed elevations from three locations in the creek, and (3) Infiltration rates for the

alluvium and the Henry formation at Site G. The above data, in conjunction with the stratigraphic columns from borings in the creek bed (St. John Report), would provide sufficient information to determine the relationship, if any, between ground water and the surface hydrology of the creek.

It was previously noted that IEPA well G106 was not located during a preliminary survey. Further attempts should be made to locate this well and to repair it if it is feasible to do so. The condition of all IEPA wells should be assessed, and reconstruction or redevelopment should be performed in accordance with the assessment.

### SITE H. ROGER'S CARTAGE PROPERTY

## Site Description

Site H is a former disposal area covering approximately five acres in Sauget, Illinois. The site is located immediately southwest of the intersection of Queeny Avenue and Falling Springs Road. Presently, Site H is an open field which has been covered, vegetated, and graded. Several depression areas, capable of retaining rain water, are also evident. Surface drainage is generally to the west; although certain localized drainage is toward the aforementioned depressions.

# Site History and Previous Investigations

A review of historical aerial photographs indicates that Site H was initially used as a disposal area sometime around 1940. Monsanto Company submitted a "Notification of Hazardous Waste Site Form" to the U.S. EPA in 1981, indicating below-ground drum disposal of organics, inorganics, and solvents. The notification listed the site name as Sauget Monsanto Illinois Landfill, and indicated that waste disposal continued until 1957. Site H is presently owned by James Tolbird of Roger's Cartage Company. Photographs suggest the site initially operated as a sand and gravel borrow pit prior to disposal activities. The southern half of Site I operated contiguously with Site H, and the properties were subsequently separated by the construction of Queeny Avenue.

Previous investigation of Site H is limited to review of historical photographs and the installation of one monitoring well downgradient from the site. This well, G110, was sampled in 1980 and 1981 as part of IEPAs hydrogeological investigation. Analytical data for well G110 is shown in Tables B-6, B-7, and B-8, presented in the Creek Sector B portion of this report. Contaminants detected in G110 include PCBs, chlorophenol, cyclohexanone, arsenic, copper, and nickel.

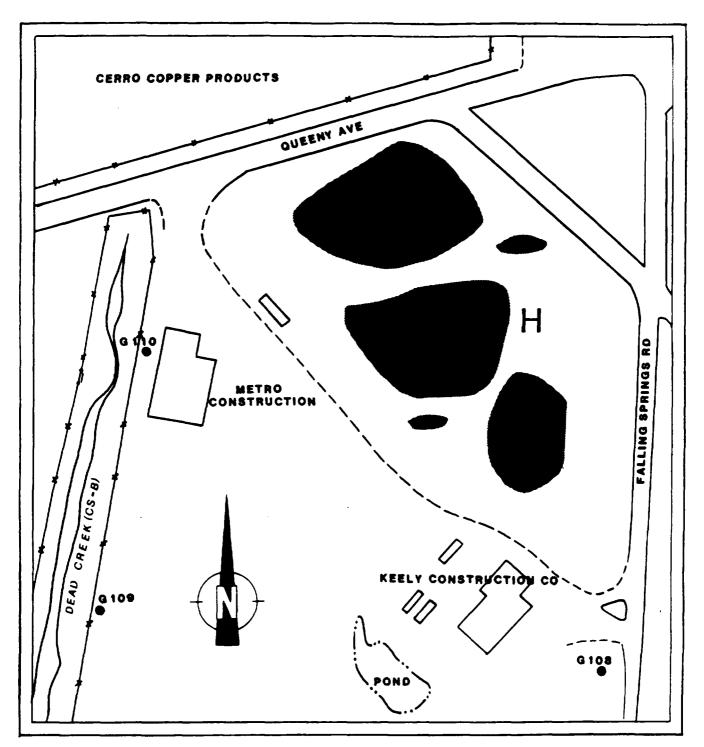
As part of the Dead Creek Project, a geophysical survey, including flux-gate magnetometry and EM, was conducted at Site H in December 1985. A survey grid with dimensions of 520 feet by 550 feet was laid out over the site using a compass and tape measure. Technos, Inc. was contracted to conduct the magnetometer survey.

The results of the magnetometer survey indicate three large areas with major magnetic anomalies and two smaller localized areas with lower intensity anomalies (Figure H-1). All anomalies are of sufficient magnitude to indicate buried drums or a large amount of other buried ferrous metal. The southernmost, large anomalous area correlated well with one of the surface depressions observed recently at the site, while the other two large areas partially correlated with depressions. This information, in conjunction with historical photographs, indicates that all anomalous areas are part of one large fill or disposal pit.

Further evaluation of Site H was done using EM with various coil spacings, allowing for different depths of penetration. Results from shallow soundings (0 to 7.5 meter effective depth range) indicate three high intensity anomalies which correlate well with the magnetic anomalies seen in the magnetometer survey. These anomalous areas were also seen in the results from intermediate soundings (5 to 15 meters). In addition, three negative anomalies were noted near the north and central portions of the site. These negative readings indicate areas of lower conductivity, and may be attributable to relatively non-conductive contaminants (organics), or to other materials such as concrete rubble or clay. Deep soundings (12 to 30 meters) showed much lower conductivity readings over the entire site, which may indicate that disposal was generally limited to a depth of less than 15 meters.

# Data Assessment and Recommendations

The absence of any detailed historical information concerning waste disposal or analytical data concerning Site H creates a major data



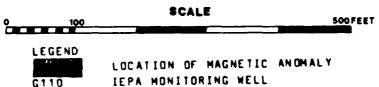


FIGURE H-1
DEAD CREEK SITE AREA H WITH MAGNETIC ANOMALIES

gap. The scope of work for this site during the Dead Creek Project includes collecting five surface and five subsurface soil samples for analysis. A soil gas survey and ambient air monitoring will also be completed at Site H. If specific contaminants are found, this data base would not be sufficient to conduct feasibility study evaluations.

Depending on the results of the initial sampling, additional sampling will be required to further define the extent of any contamination found at the site. This would include installation of monitoring wells and evaluation of ground water conditions. Further geophysical investigations to the north to Cerro Copper Products Company property would allow for more accurate definition of site boundaries and potential drum disposal areas. Additional borings and subsurface sampling or pit excavation would be necessary to accurately determine locations and types of buried wastes.

# Site Description

Site I is an operating copper refining and tube manufacturing facility covering approximately 55 acres in Sauget, Illinois. The areas of interest for the Dead Creek Project at this facility include a former sand and gravel pit which was subsequently filled with unknown wastes, and a holding pond (Creek Sector A) which formerly served as head waters for Dead Creek. The Cerro Copper Products property is bordered on the north by the Alton and Southern Railroad; on the west by Illinois Route 3; on the south by Queeny Avenue; and on the east by Falling Springs Road. The areas to be investigated encompass roughly the eastern one-third of the property. Presently, the former gravel pit/fill area is covered and graded, and is used for equipment storage.

# Site History and Previous Investigations

Cerro DePasco Corporation of New York purchased the existing plant and property west of Dead Creek in 1957 from the Lewin-Mathes Corporation. Cerro Copper subsequently added property east of the creek to their holdings in 1967. Examination of historical aerial photographs indicate subsurface disposal at Site I was discontinued sometime between the years 1955-1962. These photographs also show that Site I and Site H, which is located across Queeny Avenue to the south, constitute one large subsurface disposal area. Monsanto company submitted a "Notification of Hazardous Waste Site" form for this landfill (Sauget Monsanto Illinois Landfill), indicating disposal of organics, inorganics, and solvents in drums. The years of operation listed on the notification are "unknown to 1957." Historical photographs suggest activity at the site began prior to 1937.

Creek Sector A reportedly received discharges from Monsanto and other companies prior to 1970. In the early 1970's, the culvert

under Queeny Avenue was sealed off to restrict flow from these ponds to the remainder of Dead Creek. The ponds were subsequently regraded to the north for the purpose of directing drainage into a concrete vault with a bar screen located at the north end of the Cerro Copper Products property. When the water level in the ponds rises, the water discharges through the vault to an interceptor, which ultimately drains to the Sauget Wastewater Treatment Plant. According to Cerro Copper officials, the only direct discharges to the holding ponds at this time are area run-off and roof drainage. No process wastewater, cooling water, or other wastes are directly discharged. Five runoff drain pipes project from the west bank of the ponds.

The holding ponds, Creek Sector A, on the Cerro Copper Products property were identified as a major source of groundwater pollution in the area as a result of the IEPA Preliminary Hydrogeologic Investigation completed in 1981. Analyses of water and sediment samples from the holding ponds are included in Tables IA-1 and IA-2, and sample locations are shown in Figure IA-1. Contaminants detected at significant concentrations in these samples include PCBs, dichlorobenzene, aliphatic hydrocarbons, arsenic, cadmium, chromium, lead, and mercury.

The IEPA Preliminary Hydrogeologic Investigation also included installation of one monitoring well on the Cerro Copper Products property downgradient from Site I and the holding ponds. Analyses of samples collected from this well (well number G112) are included in Tables B-6, B-7, and B-8, located in the Creek Sector B portion of this report. Contaminants detected at elevated levels in this well include chlorobenzene, dichlorobenzene, chloroaniline, phenol, copper, phosphorus, and zinc. The contaminants in the ground water may be attributable to Site I or the holding ponds (Creek Sector A); however, a more detailed investigation is necessary to accurately determine the source.

A geophysical investigation was scheduled to be conducted at Site I as part of the initial investigations for the Dead Creek Project.

TABLE IA-1: ANALYSIS OF WATER SAMPLES FROM CREEK SECTOR A (COLLECTED BY IEPA)

SAMPLE DATE AND LOCATION

	SAMPLE DATE AND LUCATION			
PARAMETERS	11/26/80 5503 5504		1/26/81 5501 5502	
Alkalinity	127	110		
Ammonia	0.2	1.0		
Arsenic	0.058	0.025		
Barium	1.2	0.7		
BOD-5	630	158		
Boron	0.2	0.3		
Cadmium	0.36	0.19		
COD		1190		
Chloride	33	36		·
Chromium (Total)	0.61	0.21		
Copper	4.5	3.6		
Cyanide	.01	.01		
Fluoride	0.4	0.7		
Hardness	227	260		
Iron	58	28		
Lead	6.6	2.8		
Magnesium	35.8	28.7		<del></del>
Manganese	1.0	0.67		
Mercury	0.0016	0.0016		
Nickel	4.2	3.3		
Nitrate-Nitrite	1.4	1.7		
βH	6.9	7.0		
Phenols	0.02	0.035		
Phosphorus	1.9	3.4		
Potassium	4.3	6.2	<del></del>	
R.O.E.	361	407		
Selenium	0.002			
Silver	0.24	0.14		
Sodium	19.7	22.4		
Sulfate	90	130		
Zinc	30	17		
PCB (ppb)	22	28	2.0	-
Aliphatic hydrocarbons (ppb)	23,000			

NOTES: All results in ppm unless otherwise noted Blanks indicate that parameter was not analyzed

- Indicates below detection limits

TABLE IA-2: ANALYSIS OF SEDIMENT SAMPLES FROM CREEK SECTOR A (COLLECTED BY IEPA)

SAMPLE DATE AND LOCATION

	JANUEL BATE AND COATTON			
		11-26-80 1-28-81		
PARAMETERS	x128	x129	<u>x128</u>	x129
Ammonia			30	96
Barium			1200	2500
Cadmium			51	22
Calcium	1		5300	13,100
Chromium			140	490
Copper			5500	24,000
Iron	İ		29,500	51,900
Lead	İ		840	2600
Magnesium	ŀ		2300	2100
Manganese			140	250
Mercury			101	6.9
Nickel			570	1500
Potassium			670	520
Silver			29	98
Zinc	1		2300	5800
Aliphatic Hydrocarbons	13	26		
Dichlorobenzene		1.7		
PCBs	2.2	13		

NOTES: All results in ppm
Blanks indicate parameter not analyzed for
below detection limits

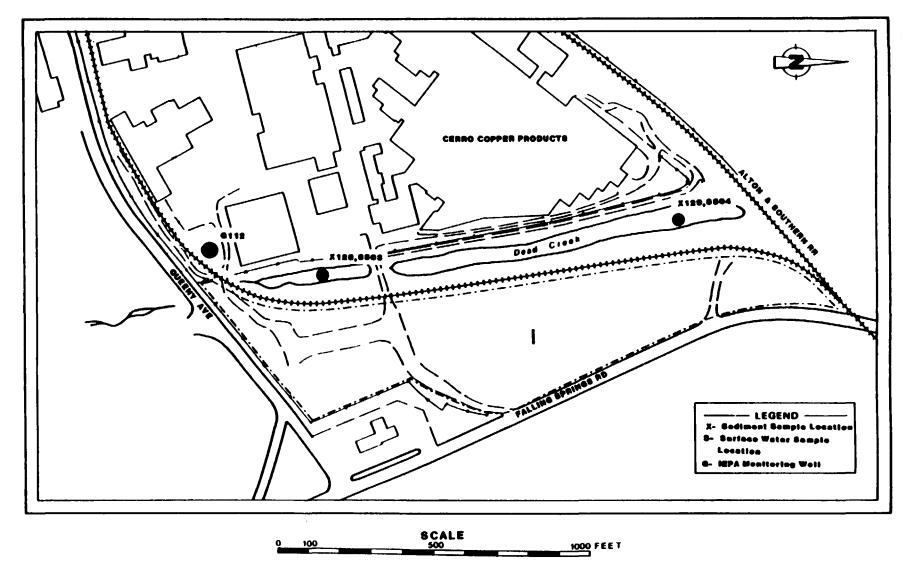


FIGURE IA-1
DEAD CREEK SITE AREA I AND CREEK SECTOR A WITH SAMPLING LOCATIONS

This investigation was cancelled on the scheduled day due to the denial of access to the site by Cerro Copper officials.

## Data Assessment and Recommendations

Field activities to be completed for these sites during the project include collecting 32 surface soil and 15 subsurface soil samples at Site I, and collecting three surface water samples from Creek Sector A. A soil gas survey and ambient air monitoring are also scheduled to be conducted at Site I. In order to have an adequate data base to complete the feasibliity study for these sites, additional information is necessary. Additional field activities should include a more detailed characterization of Creek Sector A, which would be accomplished with sediment sampling and assessment of subsurface soil and ground water conditions.

For Site I, the proposed geophysical investigation should be completed prior to any additional field activities. Subsequent to the geophysical investigation, 5-6 monitoring wells should be stratigically located to ensure efficient collection of data necessary to identify the presence of and to determine the sources of any ground water contamination. Additional subsurface soil sampling would be conducted, as necessary, in conjunction with monitoring well installation. Excavation of test pits, in conjunction with sampling, is an alternative method of data collection for Site I.

### SITE J. STERLING STEEL FOUNDRY

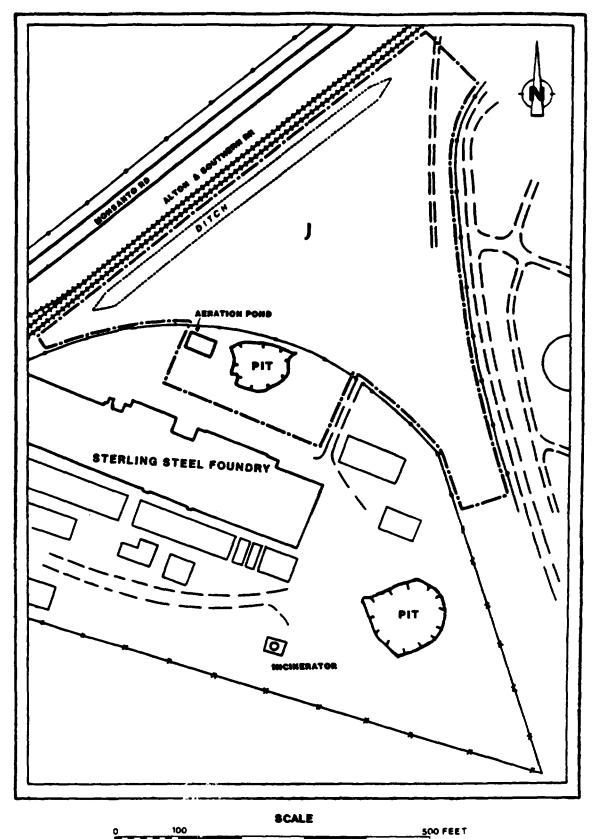
# Site Description

Site J consists of two pits and a surface disposal area utilized by an active steel foundry in the Village of Sauget, Illinois. The site is bordered on the north by the Alton and Southern Railroad; on the west by Monsanto Road; on the south by Little Avenue, and on the east by a Mobil Oil Tank Farm. The surface disposal area is defined by a triangular portion of the property to the northeast of the plant buildings. Generally, surface drainage in this area is directed toward a ditch along the northern perimeter. However, several scattered depression areas are also evident. Two unlined pits and one concrete-lined surface impoundment were observed at Site J, along with an incinerator which is no longer in use (Figure J-1).

# Site History and Previous Investigations

The pit located southeast of the plant building was excavated approximately 30 years ago, based on a review of historical aerial photographs. According to the site operator, it was a borrow pit for road construction fill. The pit was subsequently filled with scrap metal, demolition debris, and casting sand. No evidence has been found suggesting disposal of hazardous materials in the borrow pit. The other unlined pit, located north of the plant building, was excavated in approximately 1950 for the purpose of collecting and settling baghouse dust from furnaces in the foundry. The dust is blown into this pit through underground piping, thus reducing the chance for off-site migration of airborne particulates. The adjacent concrete impoundment has two aerators, used to cool water from the furnaces and compressors.

A small incinerator is situated immediately west of the former borrow pit at Site J (Figure J-1). It has a stack approximately 15-18 feet in height, and was used solely to burn trash and empty bentonite sacks, according to the plant operator. The incinerator was operated



100 500

FIGURE J-1 DEAD CREEK SITE AREA J

for 10-12 years following its installation in 1970.

The surface disposal area covers approximately six acres to the northeast of the plant buildings. Sometime in the mid-1970's, Sterling Steel began to use this area for disposal of spent casting sand, slag, scrap steel, and construction debris. No initial excavation was done in this area prior to disposal activities, other than installing a drainage ditch along the northern perimeter. The area is periodically graded, although several depressional areas are evident. Several corroded drums, apparently containing only casting sand and slag, were also observed during a recent visit to the site.

R. O. Shive and Claude Harrell began operations at Sterling Steel Castings Company at its present location in 1922. In 1982, St. Louis Steel Company purchased the facility, and the name was changed to Sterling Steel Foundry, Inc. Raw materials used in Sterling's casting operations included manganese, chromium, nickel, the molybdenum, silicon, bentonite, and water. Water is circulated from furnaces and compressors to the aerated holding pond, and wastewater is directed to the Sauget Treatment Plant.

Site J has not been previously investigated by IEPA. The site was identified by inspection of historical photographs, which indicate possible disposal in the sand pits.

The original scope of work for the Dead Creek Project, as stipulated in the RFP, called for geophysical investigations at Site J to determine potential areas of drum disposal. Based on background review and visual observation, it was determined that geophysical surveys could not adequately define such locations in the originally proposed surface disposal area. This is due to the high metal content of the wastes in the area (casting sand, slag, scrap steel, steel shot), which would result in the entire site appearing as one large anomaly, thereby making it impossible to differentiate drums from other wastes.

A scaled down geophysical survey, including flux-gate magnetometry and EM, was conducted in an area adjacent to the unlined pit northeast of the plant buildings (Figure J-1). The purpose of this survey was to determine if drum disposal may have occurred in this area. A 100 feet by 100 feet grid was set up in a grassy area immediately east of the pit, and survey lines were run on 20 foot intervals. The magnetometer survey results indicated no sigifnicant anomalies within the survey area. Several small anomalies did appear, but were not large enough to infer drums. On-site observations suggest that these smaller anomalies are a result of buried slag or interference from steel castings and scrap metals which are stored adjacent to the survey area.

An EM survey was conducted using the same basic grid system as above. However, several survey points were offset due to physical limitations (coil spacings for the EM are changed depending on desired penetration, thus necessitating offsets). Analysis of the EM data for both horizontal and vertical dipoles (10 meter spacing) indicates an elongate, elliptical-shaped anomaly southeast of the unlined pit. This anomaly dissipates to the north, and is likely attributable to the stockpiled castings and scrap.

### Data Assessment and Recommendations

No analytical data is presently available concerning Site J. The scope of work for this project includes collecting five surface and five subsurface soil samples for waste characterization. In addition to this sampling, a soil gas survey and ambient air monitoring will be conducted at Site J. If contamination is detected, additional attempts should be made to locate information concerning past operations at the site. Additional subsurface soil sampling and installation and sampling of ground water monitoring wells should then be carried out. If contamination is detected, this added investigation would be essential in order to complete feasibility study activities.

### SITE K. FORMER SAND PIT

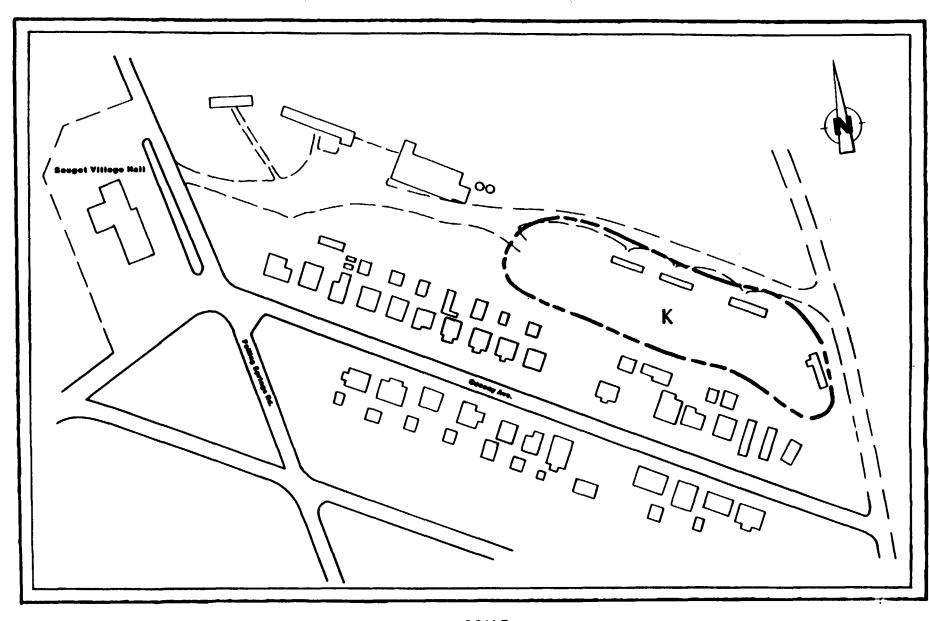
## Site Description

Site K is the location of a former sand pit for which no file information could be located. The site is located north of a residential area on Queeny Avenue, and east of Falling Springs Road in Sauget, Illinois (Figure K-1). Site K covers approximately six acres, and presently the property is unoccupied. Several trucks with the name M-T-S, Inc. (Sauget) on the doors were observed at the site during preliminary reconnaissance, but there was no activity at the property. Subsequent attempts to contact M-T-S, Inc. by telephone did not succeed. Several trailer homes and houses are located within 100 feet of the site. The pit, which constitutes Site K, has been filled and covered with soil and gravel, and the area has been graded to the surrounding topography.

# Site History and Previous Investigation

aerial photographs suggest possible waste disposal operations at Site K. Excavation at the site began sometime in the late 1940s. By 1955, the site was filled with unknown materials, and a vegetation cover had started to develop. No buildings were apparent at the site at the time of the initial excavation. After the excavation was filled, the site remained unchanged until at least Photographs from 1973 again show an excavation, somewhat larger than the first one, in the same location at Site K. This pit contained water, as seen in photographs from 1973 and 1974, and a building had been erected at the site sometime prior to 1973. information has been located concerning operations at the site during this time period. The second excavation was filled with unknown materials by 1979, and the site has apparently remained generally unchanged since that time.

Previous investigation of Site K has been limited to a review of the historical photographs. No field investigations have been conducted at the site.



8 CALE 0 100 500 FEET

> FIGURE K-1 DEAD CREEK SITE AREA K

## Data Assessment and Recommendations

No sampling and/or analytical data has been developed to date for Site K. Since other sand pits/disposal operations in the area have shown significant contamination, it is entirely possible that the disposal of hazardous materials did occur at this site. Field activities scheduled for Site K consists of collecting three subsurface soil samples and conducting soil gas and ambient air surveys. This sampling should be adequate to determine the presence of wastes and also indicate if further investigation is necessary. If contamination is detected, additional attempts should be made to locate information concerning past operations at the Additional subsurface soil sampling and installation and sampling of groundwater monitoring wells should then be carried out. If contamination is detected, this added investigation would be essential in order to complete feasibility study activities. addition. depending upon subsurface conditions identified, geophysical investigation may be of value to delineate pit boundaries as well as determine the presence of subsurface drum disposal.

#### SITE L - OLD WAGGONER COMPANY IMPOUNDMENT

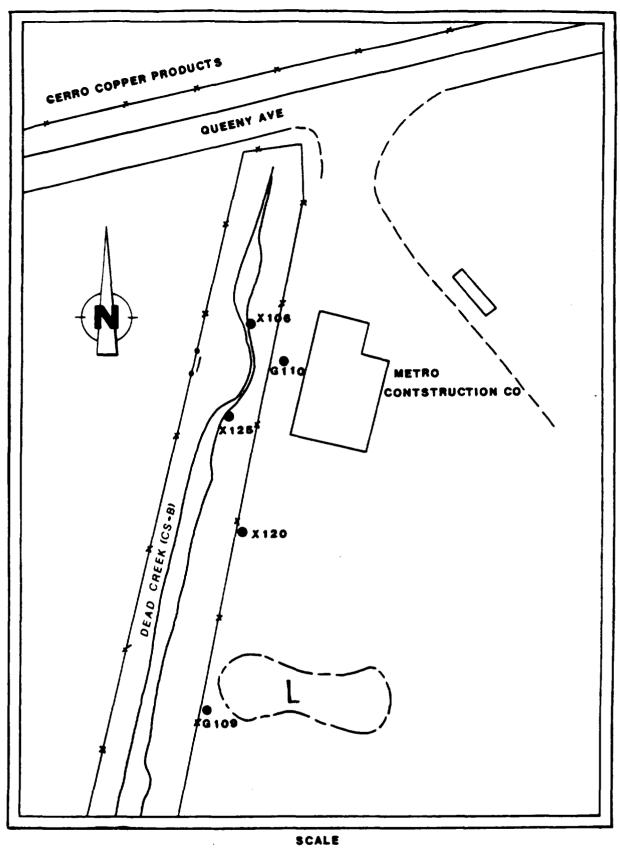
# Site Description

Site L is the location of a former surface impoundment used by the Harold Waggoner Company to dispose of wash water from a truck cleaning operation. The impoundment was situated approximately 250 feet south of the present Metro Construction Company building, and approximately 125 feet east of Dead Creek (Figure L-1). The site is now covered with black cinders, and is used by Metro Construction Company for equipment storage. Several rows of heavy equipment are presently stored in the immediate area of the former impoundment. This equipment should be moved prior to any field activities.

# Site History and Previous Investigations

Waggoner Company. owned and operated by Harold Waggoner. specialized in hauling industrial wastes for companies in the St. Louis/Metro East area. Harold Waggoner operated the company from 1964 to 1974, when he sold the operation to Ruan Trucking Company. Prior to 1971. Wagonner reportedly discharged wash water from truck cleaning operations directly to Dead Creek. In August 1971, the IEPA ordered Waggoner to cease discharging wastes to the creek. quently, a pit was excavated for the purpose of storing wash waters, and the pit was used by Waggoner until 1974. Based on a review of historical photographs, the dimensions of this pit were determined to be roughly 70 feet by 150 feet. Ruan Trucking reportedly continued this practice of wash water storage until 1978. The property was then leased, and later purchased, by Tony Lechner of Metro Construction Company.

The IEPA calculated a rough estimate of the quantity of wash water disposed of in the impoundment between 1971 and 1978. This estimated volume, 164,000 gallons, is based on the assumption that Ruan Trucking operated at the same volume as Waggoner. The estimate is useful as a starting point for further calculations concerning



0 100 400 FEET

LEGEND

G1 10 IEPA MONITORING WELL

X120 IEPA SOIL SAMPLING LOCATION

FIGURE L-1
DEAD CREEK SITE AREA L WITH SAMPLING LOCATIONS

expected leachate migration rates and plume characteristics in the ground water aquifer. It should be noted that the impoundment was not lined, and the base consisted of medium to coarse grained sands.

Site L was identified in the IEPA St. John Report as a source of both ground water and surface water contamination in the area. The IEPA study included collecting several soil/sediment samples and one groundwater sample from areas downgradient of Site L. Results from analyses of sediment samples are presented in Table B-1, located in the Creek Sector B portion of this report. Results from the analyses of groundwater samples from the monitoring well downgradient of Site L (well G109) are included in Tables B-6, B-7, and B-8 (Creek Sector B).

Monitoring well G109, located approximately 100 feet west of the former impoundment, was found to be the most polluted well during IEPA's preliminary investigation. Also, during the installation of G109, drillers became nauseous from fumes at the well location. Initial sampling conducted by IEPA on October 23, 1980 indicated the presence of chlorophenol, phenol, and cyclohexanone, along with relatively high levels of heavy metals (Table B-6). Analyses from subsequent sampling events did not show organic contaminants, other than phenol. Arsenic, cadmium, copper, nickel, and phosphorus were detected at quantities significantly above IEPA's water quality standards. Other IEPA monitoring wells adjacent to the creek showed concentrations of these contaminants at least an order of magnitude (10 times) less than those found in G109. No other likely sources of contamination are known to exist in the immediate area. In view of these points, it is likely that contaminants found in well G109 are attributable to the former disposal impoundment (Site L).

Surface soil samples collected in the vicinity of Site L during the IEPA study include X106, X120, and X125 (Figure L-1). Samples X106 and X125 were taken from the creek bed, and X120 was taken from surface soil east of the creek in the general vicinity of the

impoundment. Analyses of these samples are presented in Table B-1, which is located in the Creek Sector B portion of this report. High levels of several organic contaminants were detected in X125. These include alkyl benzenes, dichlorobenzene, dichlorophenol, hydrocarbons, naphthalenes, and trichlorobenzene at concentrations ranging from 78 to 21,000 parts per million (ppm). PCBs, including 10,000 ppm at X125, were detected in all three samples. Sample X106 was not analyzed for inorganic parameters, and concentrations of inorganics in X120 and X125 were only slightly higher than those found in the background soil sample X121 (see Tables B-1 and B-3).

Geophysical surveys were completed at Site L as part of the Dead Creek Project in December, 1985. These surveys included the use of EM and flux-gate magnetometry over a 200 feet by 200 feet grid in the area of the former disposal impoundment. Two rows of heavy equipment and trailers were present in the middle of the site at the time of the survey.

Magnetometer readings indicated a significant magnetic anomaly in the southwest corner of the site. Another large anomaly was observed between the rows of equipment: but an accurate assessment of the size and actual magnitude of the anomaly was not possible due to surface interference. An EM survey was conducted using different coil alignments to obtain readings from various depths. Shallow soundings indicated a single anomaly with the approximate dimensions of 150 feet by 100 feet in the southeast corner of Site L. Readings in this area were significantly higher than those obtained from a random check point in the cultivated field to the south. Deeper instrument penetration showed an anomaly that was similarly located in the southeast corner; however, the size and the magnitude of the readings were smaller than observed in the shallow investigation. from the remainder of Site L showed no significant anomalies, although these readings were generally higher than those seen at the check point in the cultivated field. This is probably due to cinders covering the site, which are not present in the cultivated field.

### Data Assessment and Recommendations

Investigations planned for Site L during the RI include subsurface soil sampling and soil gas monitoring. Ambient air monitoring will also be conducted as for all sites in the project.

Further activities necessary to provide adequate data for the feasibility study should include installation and sampling of 3 to 4 monitoring wells, and collecting additional subsurface soil samples. Subsurface soil sampling would be done in conjunction with well installation, and would provide additional data concerning migration of contaminants. The hydrology of the area also needs to be assessed to determine the interaction, if any, between the ground water and the creek.

Preliminary geophysical investigations and subsequent acquisition of historical aerial photographs indicate the likely presence of waste residues extending to the farmland to the south of Site L. Accordingly, additional surveys should be conducted south of the area initially surveyed. Additional geophysical investigations would allow better definition of the impoundment boundaries and also aid in delineating off-site migration of contaminants.

#### SITE M. HALL CONSTRUCTION PIT

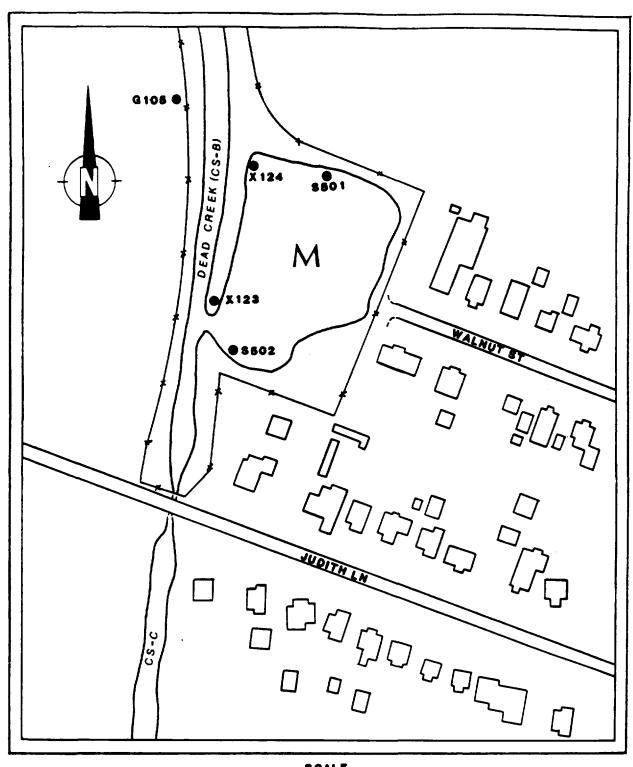
## Site Description

Site M is a sand pit excavated by the H.H. Hall Construction Company in the mid to late 1940's. The pit is located immediately east of Dead Creek, and approximately 300 feet north of Judith Lane in Cahokia, Illinois (Figure M-1). The dimensions of the pit are approximately 275 by 350 feet. Presently, Site M is enclosed by a chain link fence, which also surrounds Creek Sector B. residential area is located just east of the pit on Walnut Street. which earlier served as an access road to Site M. The pit was excavated prior to any residential development on this street. Observations suggest that the pit is apparently isolated from Dead Creek by an embankment; however, this embankment may not be continuous. Aerial photographs indicate that a small break in the southern part of the embankment may allow flow between the creek and Site M. This possibility is supported by past IEPA inspections indicating discoloration in the pit similar to that observed in Dead Creek.

## Site History and Previous Investigations

No information is available on file concerning waste disposal activities at Site M. It is possible that disposal did occur, since access to the pit remained unrestricted until a snow fence was erected in 1980. From review of historical aerial photographs, it is evident that minor changes in the dimensions of the pit have occurred. This could be an indication of filling around the perimeter of the pit. IEPA and the Cahokia Health Department have received numerous complaints about Site M and the creek from residents in the area. These complaints address, for the most part, seepage of odoriferous water into basements and problems associated with well water used to water gardens and lawns.

IEPA sampled several private wells in the area during the preliminary



SCALE 0 150 600 FEET

LEGEND

G105 EPA MONITORING WELL

X124 IEPA SEDIMENT SAMPLING LOCATION

5502 IEPA SURFACE WATER SAMPLING LOCATION

FIGURE M-1
DEAD CREEK SITE AREA M WITH SAMPLING LOCATIONS

hydrogeological study conducted in 1980. In addition, one sample of basement seepage from a home on Walnut Street near Site M was collected. Analytical results of these samples are presented in Table B-9, located in the Creek Sector B portion of the report. The results show concentrations of copper, manganese, and phosphorus above the state's water quality standards in one or more wells as well as in the basement seepage sample.

In conjunction with the creek sampling done in 1980, IEPA collected sediment and water samples from Site M. Analytical data for these samples are presented in Table M-1. In general, the water samples showed no significant contamination, although water quality standards for copper, phosphorous, and zinc were exceeded. Trace levels of PCBs (0.9 to 4.4 ppb) were found in both samples. The sediment samples, however, did show fairly high levels of several contaminants, including cadmium, chromium, copper, lead, nickel, zinc, and PCBs. In general, the samples closer to the break in the embankment separating Site M from Dead Creek showed higher levels of contaminants than the other samples.

Because water levels in the pit were approximately two feet higher than those found in the closest monitoring wells, the IEPA study concluded that there is no hydrological connection between water in the pit and the ground water aquifer. This assessment may or may not be accurate.

## Data Assessments and Recommendations

The IEPA study conducted in 1980 showed significant contamination at Site M and identified specific waste types present. Investigation of Site M for the Dead Creek Project includes collecting two surface water and three sediment samples. A soil gas survey and ambient air monitoring will also be conducted at Site M. This sampling program will not provide sufficient data to adequately evaluate remedial alternatives. Core samples should be collected from the bottom of the pit in order to determine the types of wastes present and the

TABLE M-1: ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM SITE M (COLLECTED BY IEPA 9-15-80)

# SAMPLE LOCATIONS

	SAMPLE LOCATIONS			
	Wat		Sediment	
PARAMETERS	S 501	S 502	X 123	X 124
Alkalinity	80	85		
Arsenic	0.006	0.01		
Barium	0.2	0.5	4,400	350
Berylium			3	1
BOD-5	4	33		
Boron	0.2	0.2	-	25
Cadmium	•	-	40	4
Calcium			12,500	4,500
COD	58	85		
Chloride	27	28		
Chromium	•	-	150	50
Copper	0.035	0.33	18,700	4,500
Cyanide	0.02	-		
Flouride	0.4	0.4		
Iron	0.8	1.8	49,000	13,500
Lead	• ,	0.01	1,400	130
Magnesium	6	6	3,400	3,500
Manganese	0.06	0.82	200	80
Mercury	•	-	<u> </u>	
Nickel	0.02	0.05	1,600	590
Phenol	0.01	0.01		
Phosphorus	0.17	0.31		
Potassium	5.9	6.2	950	1,000
Silver	-	-	30	6
Sodium	24	25	650	100
Strontium			175	27
Vanadium			42	19
Zinc	0.1	0.7	17,700	2,600
PCBs	0.0009	0.0044	1,100	24
Dichlorobenzene				

NOTE: All results in ppm.

Blanks indicate parameter not analyzed.

- Indicates below detection limits.

extent of vertical migration of contaminants that has occurred. In addition, several borings should be completed around the perimeter of the pit, including the embankment between the pit and the creek. It would also be necessary to verify that there is no hydrological connection between the water in the pit and the ground water aquifer. This would be best accomplished using continuous recording gauging stations at wells in the vicinity of the creek and at the pit. These activities would provide the information necessary to proceed with a viable remedial program.

### SITE N - H.H. HALL CONSTRUCTION CO.

# Site Description

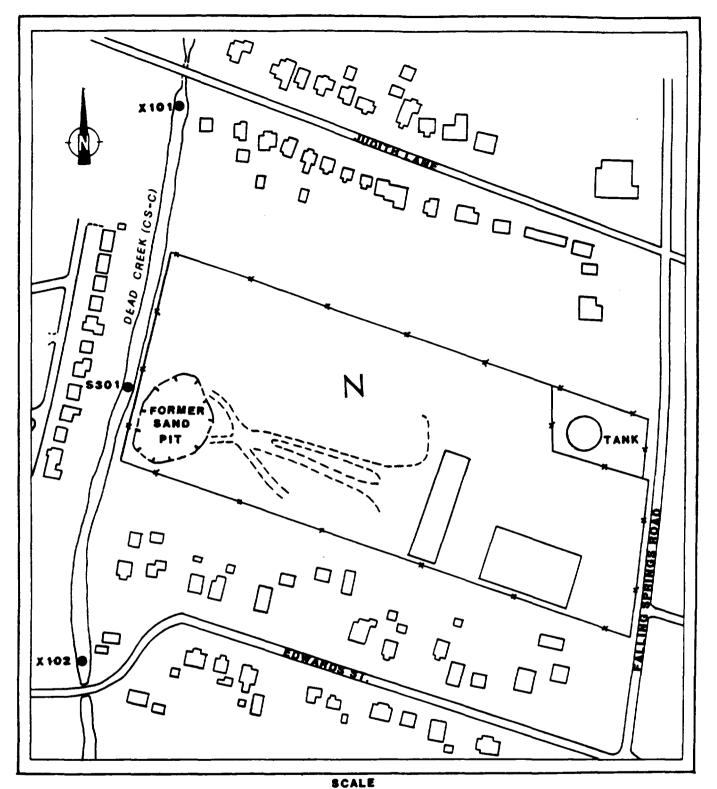
Site N is an operations and equipment storage facility for the H. H. Hall Construction Company of East St. Louis. The site is located in a residential/commercial neighborhood in the town of Cahokia, Illinois. Site N is bordered on the north by residential property along Judith Lane; on the west by Dead Creek; on the south by residential property along Edwards Street, and on the east by Falling Springs Road. The entire facility covers approximately 23 acres. Access to the site is restricted by a chain link fence.

## Site History and Previous Investigation

Historical photographs indicate that a borrow pit existed at the facility which may have been used for waste disposal. The borrow pit, located in the southwest corner adjacent to Dead Creek, is roughly 4-5 acres in size (Figure N-1). No file information has been located concerning waste disposal at Site N. The pit has been filled and covered.

Historical photographs indicate that excavation at Site N began sometime prior to 1950. The presence of water in the pit was displayed in photographs from 1950, suggesting excavation into the Henry Formation aquifer. Hall Construction Company officials were recently contacted in an attempt to gather further information about the site. Apparently the pit was excavated in the late 1940's as a borrow pit for road construction materials. According to the officials contacted, concrete rubble and other demolition debris are the only wastes disposed of in the pit by Hall Construction. The area is presently covered with rubble and debris and is used only for equipment storage.

Although no analytical data has been developed for Site N, it should not be overlooked as a possible source of contamination in the area.



0 100 200 800 FEET

LEGEND

X101 IEPA SEDIMENT SAMPLING LOCATION

5301 IEPA SURFACE WATER SAMPLING LOCATION

FIGURE N-1

DEAD CREEK SITE AREA N WITH SAMPLING LOCATIONS IN CREEK SECTOR C

The site is located adjacent to Creek Sector C of Dead Creek, which has shown elevated levels of several contaminants, including PCBs. At this time, it cannot be determined if the contamination in Creek Sector C is the result of flow from the heavily-contaminated Creek Sector B, or the result of other unknown sources. It is also not known if access to Site N has always been restricted. Accordingly, the possibility exists that other parties may have used the pit for disposal.

# Data Assessment and Recommendations

No sampling or field investigation data is presently available for Site N. Field activities scheduled at Site N during the Dead Creek Project include collecting three surface and two subsurface soil samples. In addition, a soil gas survey and ambient air monitoring will be conducted at the site. These investigations should be adequate to characterize the types of wastes present. The results of this sampling should also indicate if further investigation of the site is warranted.

If contamination is identified at the site, additional subsurface soil sampling and installation and sampling of groundwater monitoring wells should be carried out. This added investigation would be essential to complete feasibility study activities. In addition, depending upon subsurface conditions identified, a geophysical investigation may be of value to delineate pit boundaries and determine the presence of subsurface drum disposal. The hydrology of the creek in relation to the site should also be assessed to determine the potential for discharge from the pit to the creek.

## Site Description

Site 0 is the Sauget Waste Water Treatment Plant and related property, located on Mobile Avenue in Sauget, Illinois. The property covers approximately 45 acres in a heavily industrialized area. The site consists of a series of four inactive sludge dewatering lagoons and a separate area of contamination. The former sludge lagoons cover approximately 20 acres to the south of the treatment plant buildings, and the identified contaminated area (3 acres) is located immediately west of the Sauget Waste Water Treatment Plant on the northwest corner of the property.

# Site History and Previous Investigations

The Sauget Treatment Plant has been in operation in some form since approximately 1952. The plant primarily treats effluent from area industries, but also provides treatment for the entire Village of Sauget. Approximately ten million gallons per day (MGD) of waste water is treated at this facility, of which over 95 percent is from industrial sources. Area industries served by the Sauget Treatment Plant include Monsanto Chemical, Cerro Copper, Sterling Steel Foundry, Amax Zinc, Rogers Cartage, Edwin Cooper, and Midwest Rubber. Effluent from the treatment plant is directed to a National Pollutant Discharge Elimination System (NPDES) permitted discharge point in the Mississippi River.

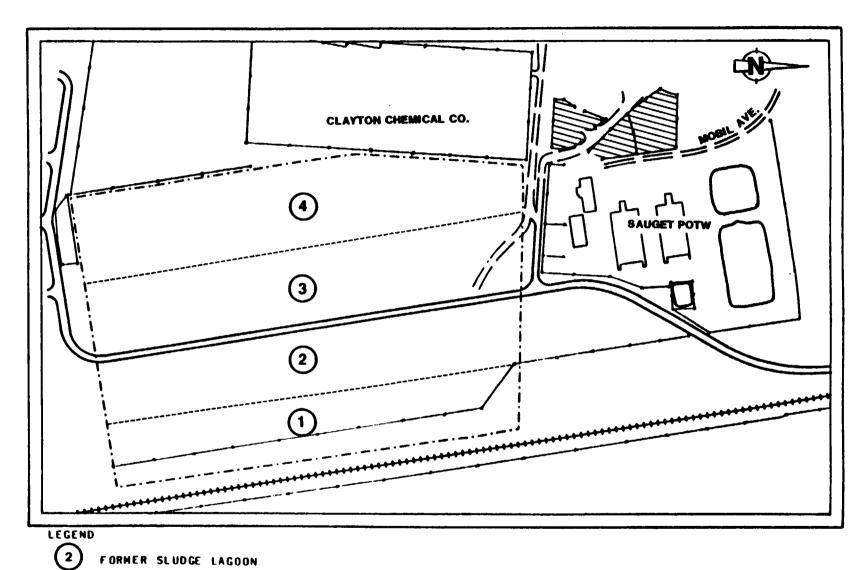
The treatment plant has a long history of NPDES permit violations, for the most part due to the chemical quality of the plant effluent. Mercury, PCBs, and organic solvents have been detected at concentrations exceeding permit limits on several occasions. A USEPA study conducted in 1982 concluded that the treatment plant waste water contributed a substantial volume of priority, toxic pollutants annually to the Mississippi River. Since operations began, the plant has undergone several modifications and upgrades, increasing both

capacity and effluent quality.

According to a Notification of Hazardous Waste Site Form submitted to USEPA in 1981, the former lagoons were used for disposal of clarifier sludges from 1965 to approximately 1978. The lagoons were designed to drain liquid from the sludge. The lagoons were not artificially lined, and were apparently excavated into the Henry Formation Sand. Initially, the sludge was not treated in any way after being placed in the lagoons. After an unknown period of time, lime was used for neutralization.

In 1982, IEPA personnel collected a sample of filter cake sludge from the treatment plant, which provides an indication of the chemical quality of sludges placed in the lagoons. Analysis of this sample showed several organic contaminants, including chlorinated benzenes, xylene, and aliphatic hydrocarbons, at concentrations ranging from 120 to 820 ppm. The lagoons are presently covered with two feet of clay and have been vegetated. Sludges from the Sauget Treatment Plant, which is still in operation, are presently taken to two IEPA-permitted landfills in the St. Louis Metro-East area.

Extensive construction/excavation has been done since 1981 in the area surrounding the Sauget Treatment Plant. The new American Bottoms Regional Treatment Plant, completed in 1985 but not on line as yet, is located immediately south of the former sludge lagoons. Several problems involving chemical wastes were encountered during excavation work for the construction of this facility. workers uncovered a black, tar-like substance with a strong solvent odor while digging a trench for sewer and water lines to the new treatment plant. Although file information is sketchy concerning the exact location of this incident, it is thought to be in the southern portion of Lagoons 3 and 4 (Figure 0-1). Two samples of the waste material were collected by Envirodyne Engineers, Inc. (EEI) of St. Louis, and a limited organic analysis was run. Both samples showed the presence of PCBs (477 to 653 ppm), phenol (0.28 to 12.0 ppm), and oil and grease (29 to 35 percent). Benzene was also detected at



APPROXIMATE LAGOON BOUNDARY
AREA OF INDENTIFIED SOIL CONTAMINATION

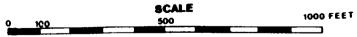


FIGURE 0-1 FORMER SLUDGE LAGOONS AND CONTAMINATED SOIL AREAS AT SITE O

trace levels (1 ppb) in both samples.

Several additional locations have reportedly been sampled by EEI as a result of uncovering waste materials during excavation activities around the Sauget Treatment Plant. However, attempts to gather information concerning specific sample locations and analytical data have been of limited success. Chemical data for two soil samples collected from excavated soil piles in the area of the former sludge lagoons was acquired. These results are shown in Table 0-1. Both samples show high levels of several chlorinated organics and other priority pollutants. Values were listed for total PCBs, however, the PCB results could not be verified by the laboratory. Although limited data has been acquired, available data indicates that the former sludge lagoon area likely contains widespread organic and inorganic contamination.

In 1983, IEPA identified another highly contaminated area at Site O. This area is located directly west of the existing treatment plant and approximately 200 feet north of the Clayton Chemical Company property (Figure 0-1). IEPA and EEI personnel conducted a cooperative sampling effort in this area during February and March of A total of 33 surface and subsurface soil samples were collected and analyzed for PCBs and TCDD (samples collected in March were analyzed for TCDD only). Analytical results for these samples are shown in Tables 0-2 and 0-3. The results of initial sampling done in February show relatively high levels of PCBs in all samples, including those taken to a depth of 14 inches. Sample location 5, in the area of a proposed effluent-pump station, was the only location where TCDD was detected in the initial sampling. Based on the results from samples collected in February, it was determined that further sampling would be necessary. In March, 1983, 21 soil samples were collected from 10 locations in the area of the initial sampling. Depths of these samples ranged from 0 to 28 inches. Sample number 14 was a composite of several soil piles, and samples 10A and 10B were spiked control samples. The results of these samples indicate significant TCDD contamination throughout the area. Sample locations

TABLE 0-1: IDENTIFIED ORGANIC COMPOUNDS IN SAMPLES FROM TRENCH EXCAVATION AT SITE O (COLLECTED JULY 20, 1984 BY RUSSELL AND AXON, INC.) a

SAMPLE LOCATIONS

<del></del>					
PARAMETERS	SAMPLE 1	SAMPLE 2	BLANK		
2,4-Dichlorophenol	50.1				
Pentachlorophenol	3,600	159	]		
2,4,6-Trichlorophenol	39.3				
Crysene	123	2.2			
Benzo-k-Fluoranthene	15.9	0.45			
Bis(2-Ethylhexyl) Phthalate	10.9		0.098		
1,2-Chlorobenzene		12.2			
1,4-Dichlorobenzene		8.01			
Di-Butyl Phthalate		5.06	0.1		
Phenanthrene	100	1.6			
Pyrene	102	2.1			
1,2,4-Trichlorobenzene	65.3	1.6	1		
PCBs	*	*			
Benzo(a)Pyrene	4.2	1.0			

NOTE: All results in ppm.

Blanks indicate compound not detected.
\* Identified, but values cannot be verified.

a Analysis performed by Envirodyne Engineers, Inc. (EEI), St. Louis, MO.

# TABLE 02: ANALYTICAL RESULTS FOR SOIL SAMPLES AT SITE O (SPLIT SAMPLES COLLECTED FEBRUARY 19, 1983 BY IEPA AND EEI)

## **PARAMETERS**

SAMPLE NO. (Depth)	PCB - IEPA	PCB - EEI	TCDD - IEPAª	TCDD - EEI	Comment
1 (0" - F")	1,500	3,690			
2A (0"- F")	7,600	5,350			
28 (7" - 13")	390	716			
3A (0" - 7")	9,100	137,250			
38 (7" - 13")	40	28	'		
4A (0" - 6")	20,000	21,020			
4A (0" - 6")	-	15,510			Duplicate-EEI
48 (6" - 13")	54,000	149,600		ļ	
5A (0" - 6")	32,000	112,930	18	28	
5A (0" - 6")	-	-	17	-	Duplicate-IEPA
5B (6" - 14")	20,000	12,050	4.1	5.1	1
6 (0" - 8")	120	90			

NOTE: All results in ng/g (ppb).

Blanks indicate below detection limits.

- Indicates parameter not analyzed.
- a Hazelton Raltech, Inc. performed TCDD analysis for IEPA.

TABLE 0-3: ANALYTICAL RESULTS FOR SOIL SAMPLES AT SITE 0. (SPLIT SAMPLES COLLECTED MARCH 12, 1983 BY IEPA AND EEI)

### PARAMETERS

		PARAMETERS	
SAMPLE NO. (Depth)	TCDD - IEPAª	TCDD - EEI	COMMENTS
7A (0"- 6") 7B (8" - 16") 8A (0" - 6") 8B (6" - 12) 8C (13" - 18") 8D (18" - 25")	1.8 77 *	44 Interferences 19 37 56	Duplicate
9A (0" - 6") 9B (6" - 12") 9C (14" - 21") 9D (22" - 28") 10A 10B	1.3 * 0.92 12 *	13	Control Sample Control Sample
11A (0" - 6") 11B (G" - 18") 12 (10" - 19") 13A (0" - 7") 13B (7" - 18") 14 (0" - 6") 15 (0" - 16") 16 (0" - 18")	* * 13 25	13 170	Composite of soil samples

NOTE: All results in ng/g (ppb).

Blanks indicate below detection limits.

\* Sample not collected by IEPA.
a Hazelton Raltech, Inc. performed TCDD analysis for IEPA.

8, 15 and 16, all near the proposed pump station, showed the highest concentrations of TCDD (ranging from 13 to 170 ppb).

Based on the results of the sampling done in February and March, 1983, USEPA estimated that 2800 cubic yards of contaminated soil existed at the site. Further sampling was proposed by USEPA to determine the extent of PCB and dioxin contamination, and plans were prepared by Russell and Axon, Inc., a contractor for the Village of Sauget, for a temporary containment facility for the contaminated soil. The USEPA, IEPA, the Village of Sauget, and contractors representing the village were involved in discussions concerning possible remedial alternatives for the contaminated soil. However, no remedial actions have been implemented to date. Presently, a fence encloses the contaminated area, and the surface has been covered with gravel.

The source of the PCB and dioxin contamination on the northwest portion of the site has not been conclusively determined. A likely source is a tank owned by Bliss Waste Oil of Missouri, which was located on the Clayton Chemical Company property. Bliss Waste Oil had four above-ground storage tanks located in the northern portion of Clayton's property which were used to store waste oil and diesel fuel. In February, 1983, a former employee of Bliss informed IEPA of a leaking underground storage tank owned by Bliss in the area of the other tanks. This tank was apparently used to drain unwanted liquid from the above ground tanks.

IEPA located the underground tank and conducted preliminary sampling an excavated area around the tank. Analysis of these samples detected significant levels of PCBs and other priority pollutant organic compounds. In June, 1983, the underground tank was removed by a contractor for Russell Bliss (the former owner), and additional sampling was done to determine the extent of remaining soil contamination. Liquids and sludges in the tank were containerized, along with contaminated soil from the excavation. All containerized materials were removed to a licensed hazardous waste facility by November, 1983.

# Data Assessment and Recommendations

Based on the information outlined above, there is significant and widespread contamination in the area of the Sauget Treatment Plant. Additional information is available from Russell and Axon, Inc., and further attempts should be made to secure all data pertaining to chemical wastes in the area from this contractor. A significant amount of analytical data has been generated for the contaminated area west of the treatment plant. However, the horizontal and vertical extent of contamination has not been assessed. Similarly, very little data is available with respect to the former sludge lagoons which would be useful in proposing remedial alteratives.

The present scope of work for this project includes only collecting and cataloging all data pertaining to Site O. Wastes have been characterized in the area west of the treatment plant, and two major contaminants have been identified to a depth of 28 inches in this Data is also available from samples taken in the vicinity of the former sludge lagoons which provides an indication of possible waste types present in the lagoons. The approximate boundaries of the lagoons can be determined based on a review of historical aerial photographs. The data generated to date for Site O indicates that further field investigation is warranted. In order to define and specify remedial alternatives, the areas of subsurface soil contamination need to be accurately defined. addition, since the sludge lagoons are not lined, and may have been excavated into the Henry Formation aquifer, a strong possibility for ground water contamination exists.

For the former sludge lagoons, it is recommended that soil borings be completed into the lagoons to a depth sufficient to assess the vertical migration of contaminants from the lagoons. The borings should be located so as to provide intersecting cross sections for mapping purposes, and should cover the entire lagoon area. Samples should be composited for ten foot intervals for each boring and analyzed for all hazard substance list (HSL) compounds. These

borings and samples would provide adequate characaterization of the chemical constituents present in the lagoons and provide information concerning vertical migration of contaminants. In addition, four deeper borings should be completed around the periphery of the lagoons to determine if, or to what extent, wastes have migrated from the lagoons. Detailed field screening would be done on samples from these borings using a portable gas chromatograph (GC). A geophysical investigation using electromagnetics would be completed in conjunction with these borings to define the lateral extent of any contaminant plume that may be present. If initial borings into the lagoons indicate that ground water monitoring is necessary, the deeper borings around the periphery could be used for monitoring well emplacement.

The identified area of soil contamination west of the treatment plant should be more accurately defined. Recommendations for this area include completing several test borings in the area to determine the maximum depth of contamination, followed by grid sampling to accurately define the contaminated area. Samples collected from the test borings could be extracted and analyzed for PCBs in the field using GC. Since they were found at high concentrations in previous samples, PCBs would be a good indicator for other possible contaminants. Following the determination of the maximum depth of contamination, a detailed sampling program should be developed and conducted in order to define the extent of contamination.

### SITE P - SAUGET/MONSANTO LANDFILL

# Site Description

Site P is an inactive, IEPA-permitted landfill covering approximately 20 acres in Sauget, Illinois (Figure P-1). The site is bordered on the west by the Illinois Central Gulf Railroad; on the south by Monsanto Avenue, and on the east by the Terminal Railroad Association railroad. The two railroads converge to delineate the north boundary. Generally, the geology at the site consists of silty sand, underlain by fine grained to silty clay, followed by fine to coarse grained sands down to the bedrock. Surface drainage is to the south-central portion of the site, which was not landfilled due to the presence of a potable water line in this area. A depression area is also found along the east perimeter, adjacent to the Terminal Railroad. Surface drainage will not leave the site due to the presence of railroad embankments along the perimeter and the depression in the central portion of the site.

# Site History and Previous Investigations

Sauget and Company entered into a lease agreement with the Union Electric Company in St. Louis to operate a waste disposal facility in 1972. In January 1973, IEPA issued an operating permit to Sauget and Company to accept only non-chemical waste from Monsanto. Sauget and Company subsequently applied for, and was granted, a supplemental permit in 1974 which allowed acceptance of general waste and diatomaceous earth filter cake from Edwin Cooper, Inc. (now Ethyl Corp.). The IEPA began conducting routine inspections of the facility in 1974, at which time no violations were evident. In October 1975, an inspector observed a small amount of yellowish, tar-like liquid in an area adjacent to several crushed fiber drums which were labelled "Monsanto ACL-85, Chlorine Composition." Sauget and Company and Monsanto were subsequently notified of this permit violation, and the matter was not further addressed. The site was operated in general compliance until December 1977, when an

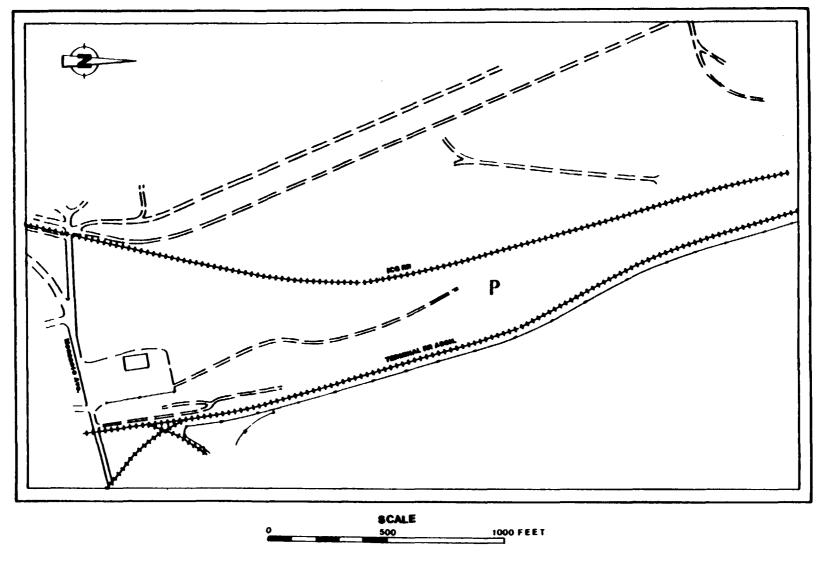


FIGURE P-1
DEAD CREEK SITE AREA P

inspection revealed the disposal of approximately 25 metal containers (12-15 gallon) full of phosphorus pentasulfide ( $P_2S_5$ ), a flammable solid. Monsanto was required to excavate and remove all of this material from the site, and to discontinue disposal of any chemical wastes or packagings.

The IEPA became aware of another potential problem at this time, specifically the use of a Southern Railway slag pile for intermediate and final cover material. Analysis of this slag showed it to be unsuitable as cover due to its high permeability and heavy metal content. Cinders were also used as cover material at Site P, and are expected to pose the same problems as the slag; that is, increased surface water infiltration and the resulting potential for leaching heavy metals along with organic wastes into the groundwater.

State inspections in 1978 and 1979 indicated unpermitted disposal of Monsanto ACL filter residues and packagings. The composition of this material is not known. According to the site operator at that time, this material would occasionally ignite when in contact with the filter cake waste from Edwin Cooper.

An Illinois American Water Company distribution main was discovered in 1980 during preparatory excavation on the southern portion of the site. The south one-third of the property was purchased from Illinois Central Gulf in 1971 by Paul Sauget. Following discovery of the water line, Site Plans and permits were modified to include no waste disposal within 100 feet of the line.

Review of available IEPA records indicates that the Edwin Cooper filter cake is the only industrial process waste that was reported to have been disposed of at Site P. Records indicate that approximately 117,000 cubic yards of this material was accepted. The filter cake was classified as non-hazardous on special waste authorization permit number 7400017, based on EP toxicity results submitted in 1973. Additional analytical data is available for a filter cake composite sample from Edwin Cooper in 1979 which indicates elevated levels of

lead (18.4 ppm), cadmium (1.8), zinc (7,220 ppm), and a pH of 11.22. No groundwater monitoring program has been established for Site P, nor have wastes at the site been adequately characterized. No sampling or other field investigation activities have been conducted, other than routine IEPA inspections, at the site.

# Data Assessment and Recommendations

A groundwater study consisting of installation and sampling of 6 wells is the only planned field investigation for Site P during the Dead Creek Project. Additional investigation will be necessary to adequately characterize the site and to provide an adequate data base for conducting the feasibility study if groundwater contamination is detected. Further evaluation of subsurface soil conditions at the site would be necessary in order to define waste characteristics and the vertical and lateral extent of contamination so that remedial alternatives can be assessed.

### SITE Q - SAUGET/SAUGET LANDFILL

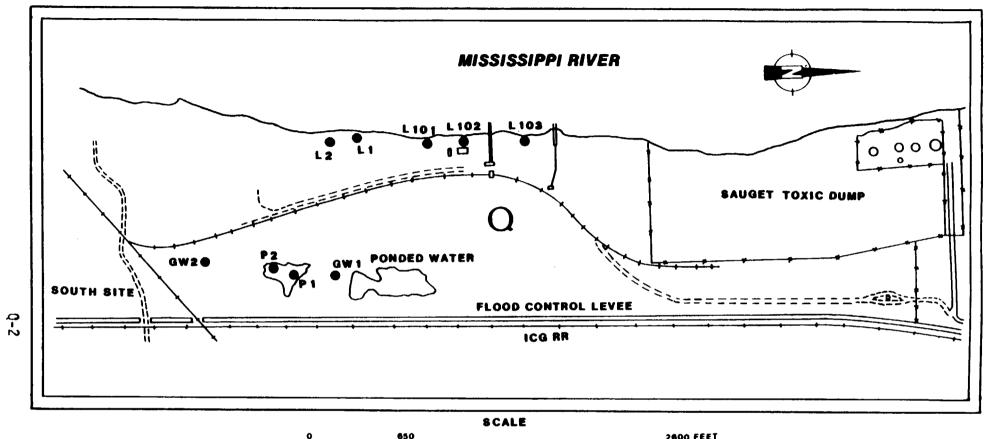
# Site Description

Site Q is the Sauget/Sauget Landfill, an inactive waste disposal facility operated by Sauget and Company between the years 1966 and 1973. The site is approximately 90 acres in size, including a southern extension, as delineated by the Alton and Southern Railroad tracks (Figure Q-1). The site is located on east bank of the Mississippi River and is also on the river side of a U.S. Army Corps of Engineers flood control levee. Site Q is also situated immediately east of Site R, commonly known at Sauget Toxic Dump, a chemical waste disposal facility owned by the Monsanto Chemical Company.

Site Q was operated without a permit from IEPA, although registration with the Illinois Department of Public Health was obtained for the north site in 1967, prior to the formation of the IEPA. The site is presently covered with black cinders, which is an unsuitable cover material due to its high permeability. Site Q is presently owned by the Riverport Terminal and Fleeting Company, and the property is leased to the Pillsbury Company. Pillsbury operates a coal unloading facility at the site.

### Site History and Previous Investgations

Disposal operations at Site Q began in approximately 1966 in the northernmost portion of the property. A Union Electric Company flyash pond existed at the site in an area immediately south of Monsanto's chemical dump. IEPA inspections in the early 1970's documented several violations of the Illinois Environmental Protection Act, including open burning, use of unsuitable cover materials (cinders and flyash), and acceptance of liquid chemical wastes. Septic tank pumpings were also accepted at the site from approximately 1968 to 1972, and were apparently co-disposed with general municipal refuse.





LEGEND

CH1 IEPA GROUNDWATER SAMPLING LOCATION

P1 IEPA SURFACE WATER SAMPLING LOCATION

L1 IEPA LEACHATE SAMPLING LOCATION

FIGURE Q-1
DEAD CREEK SITE AREA Q WITH SAMPLING LOCATIONS

in April, 1971, a complaint was filed by IEPA against Sauget and Company for the violations mentioned above. The company was ordered to cease and desist open burning, accepting liquid chemical wastes, open dumping, and use of cinders and flyash as cover material. In July, 1972, a smoldering underground fire was observed by IEPA inspectors at the site. The fire continued to smolder until October, 1972 despite repeated attempts to extinguish it. Underground fires were a continuing problem, as documented by later IEPA inspection reports. In the spring of 1973, flood waters from the Mississippi River inundated Site Q. This condition persisted into the fall, and operations at the site were discontinued. Exposed refuse was observed being carried downstream in the river at that time.

Sauget and Company filed a permit application to IEPA in 1972 for a proposed extension to the existing landfill. The proposed extension was located south of the Alton and Southern railroad tracks, and will be referred to as the south site. IEPA denied issuance of a permit for this extension several times, as Sauget and Company had filed repeated applications. Although approval of the south site was never issued, disposal operations continued in this area.

In the early 1970's, IEPA collected several samples from Site Q. Approximate sample locations are shown in Figure Q-1. data for samples collected from ponded water, leachate seeps, and ground water are provided in Table Q-1. The first set of samples, collected in October, 1972, consisted of one sample from ponded water, and one leachate sample. The results for these samples show the presence of several metals, including copper, iron, lead, mercury, and zinc. Ground water samples were collected in January, 1973 from two monitoring wells at Site Q. Information regarding construction details for these wells has not been located. GW-1 showed trace levels of cadmium, silver, and phenols, while GW-2 showed very little evidence of contamination. Samples were again collected by IEPA from ponded water at Site Q on two occasions in April, 1973. Analytical results showed low levels of boron, cadmium, copper, iron, lead, manganese, mercury, nickel, and zinc in sample

TABLE Q-1: ANALYSIS OF SURFACE AND GROUND WATER SAMPLES COLLECTED BY IEPA AT SITE Q

SAMPLE LOCATIONS AND DATES

	3/11/ EE EGG// 10/13 /11/EG					
PARAMETERS	P-1	7/72 L-1	GW-1	<u>-73</u> GW-2	4-10-73 P-2	4-26-73 P-3
Calcium	80	56	310	137	250	280
Magnesium	8	26	57	205	42	44
Sodium	8 23	169	275	13	230	205
Potassium	6	30	10	4	85	70
Ammonia	0.19	21	NA	NA	32	36
Boron	7	6.5	NA	NA	2.6	2.8
Cadmium	•		0.02		NA NA	0.02
Chromium (Total)					NA NA	0.03
Copper		0.01			0.02	
Iron		46			60	67
Lead		0.02			0.07	0.07
Manganese					6	6.5
Mercury (ppb)	0.5	0.5			0.4	0.6
Nickel					0.3	0.2
Silver	<del></del>		0.01		<del></del>	
Zinc		0.2		0.1	4.2	5
Alkalinity	46	810	645	375	420	
Chloride	19	4	310	24	210	205
Nitrate	NA	NA	NA	NA	NA	
Phosphate	NA	NA	NA	NA	3.7	5
Sulfate	230	18	325	25	350	270
Hardness	240	560	NA	NA	970	930
Phenols	NA	NA	0.02		NA	NA

NOTE: All results in ppm unless noted otherwise. Blanks indicate below detection limit. NA indicated parameter not analyzed.

P = Ponded water, L = Leachate, GW = Groundwater

P-2 and/or P-3. Although the data from samples collected in the early 1970's showed the presence of several contaminants, most notably phenol and heavy metals, no conclusive evidence of contamination at Site 0 was obtained.

IEPA collected samples from leachate seeps along the Mississippi River in October, 1981 and again in September, 1983. The locations of these samples are shown in Figure Q-1, and analytical results are presented in Table Q-2. Data for the 1981 samples shows elevated concentrations of arsenic, chromium, copper, lead, managanese, and phosphorus in both samples. Additionally, low levels of phenols and PCBs were detected in the samples. The samples collected in September, 1983 show very similar results. Heavy metals and PCBs were again detected at concentrations very close to those seen in the earlier samples.

The cinders and flyash used as cover materials at Site Q have been the subject of numerous investigations and complaints by IEPA. In addition, the depth of final cover has been deemed inadequate, and enforcement action is pending on this matter. The Illinois Pollution Control Board Case Number 77-84 was filed against Sauget and Company and Paul Sauget in May, 1977. As a result of the findings in this case, a monetary penalty was invoked, and Sauget and Company was ordered to place two feet of suitable cover material on the entire site by February, 1981. Sauget's failure to comply with these orders led the Illinois Attorney General's office to file a similar case. Site Q has been a chronic enforcement problem, and recently Paul Sauget was found in contempt of court for failure to comply with court orders.

Laboratory tests run on the cinders and flyash indicate permeability values in the range of 9 x  $10^{-3}$  centimeters per second, which is considered unsuitable by IEPA. In addition, metals analysis of the cover material showed unacceptably high levels of arsenic, copper, lead, and zinc. In 1972, IEPA collected samples from stockpiled flyash at Site Q, and ran leach tests for inorganic constituents.

TABLE Q-2: ANALYSIS OF LEACHATE SAMPLES FROM SITE Q (COLLECTED OCTOBER 28, 1981 AND SEPTEMBER 29, 1983 BY IEPA)

SAMPLE LOCATIONS AND DATES

<del></del>		SAMELL L	OCALIONS	מונט טעונט	
PARAMETERS	L-1	8-81 L-2	L101	9-29-83 L012	L103
Alkalinity	255	293	191	158	242
Ammonia	3.8	2.8	6.5	4	3.7
Arsenic	0.057	0.022	0.11	0.034	0.012
Barium	0.8	0.2	0.5	0.4	0.3
Boron	5.8	5.6	37.5	42	23
Cadmium			1		
COD	445	35	87	94	71
Chloride	15	17	23	22	31
Chromium (Total)	0.08		0.03	0.01	
Copper	0.2	0.04	1.2	0.06	
Cyanide	•			0.01	0.01
Hardness	1330	1220	1225	1360	1045
Iron	207	17.5	86	36	6.4
Lead	0.26		0.13	0.08	0.02
Magnesium	145	67	81	73	44.5
Manganese	7.7	34	6.7	6.8	2.7
Mercury					
Nickel	0.3		0.1	0.1	
Nitrate	0.24	0.4	0.21	6.1	1.8
Phosphorus	6.1	0.74	3.1	1.3	0.86
Potassium	16.5	9.5	13.4	13.5	17
R.O.E.	1980	1829	1880	2118	1563
Silver	0.02	0.01	0.01		
Sodium	55.7	53.3	56	70	51
Sulfate	1196	1059	1200	1350	900
Zinc	1.2	0.2	0.3	0.2	
Phenol	0.005	0.005			
PCBs (PPB)	0.7	1	0.5		0.1
2,3-D(PPB)					

NOTE: All results in ppm unless noted otherwise. Blanks indicate below detection limits.

Samples were taken from piles estimated to be 5 years old, 1 year old, and fresh material to determine the types and quantities of contaminants being leached from this material at the site. Analytical data for these samples are shown in Table Q-3. Analysis of the first set of samples (August, 1972) shows a distinct trend of the more soluble compounds, such as calcium, sodium and potassium, being leached from the fresh ash. However, the second set of samples, collected in October 1972, does not show a similar trend. The reasons for this discrepancy are not clear. The data in Table Q-3 also shows that significant quantities of metals are contained in the ash, particularly for the material estimated to be five years old.

IEPA's Notices of Violations concerning disposal of chemical wastes at Site Q in early inspections are supported by more recent information. Notification of Hazardous Waste Site Forms were submitted to USEPA from three companies for this site. These notifications indicate disposal of organics, inorganics, solvents, pesticides, paint sludges, and unknown wastes at the site. In May, 1980 workers uncovered buried drums and unknown wastes while excavating for construction of a railroad spur on the property. Workers observed a haze or smoke rising from the material after it was uncovered, suggesting corrosive and/or reactive properties.

In November, 1985, IEPA received a sketch from a reporter for a St. Louis newspaper indicating the location of buried drums containing PCBs. The reporter's source of this information is not known, nor has the information been verified to date.

As a result of the May, 1980 incident in which buried drums were unearthed, USEPA tasked its FIT contractor (Ecology and Environment, Inc.) to perform a detailed study to determine the extent of chemical contamination at Site Q. The study included a systematic geophysical investigation using EM, magnetometry, and ground penetrating radar (GPR), followed by a drilling and sampling program to investigate possible subsurface contamination. The investigation was limited

TABLE Q-3: ANALYSIS OF FLYASH USED AS COVER FROM STOCKPILES AT SITE Q (SAMPLED BY IEPA IN 1972)

SAMPLE NUMBERS AND DATES

		8/3/72			10/16/72	
PARAMETERS	5 Years	l Year	Fresh	5 Years	1 Year	Fresh
Calcium	125	245	285	580	120	130
Magnesium	4.6	6.4	0.5	9	2	
Sodium	10	7.5	58	140	1.3	36
Potassium	7	11	79	56	2	45
Ammonia	1.8	0.36	0.47	0.75	0.05	0.1
Arsenic	NA NA	NA	NA			0.0
Barium	0.1		0.1			
Boron	0.9	3.6	1.8	1.3	0.6	2.4
Cadmium	0.01	0.01	0.02	0.02		
Chromium				0.03		
Copper	0.09	0.01	0.01	0.06		
Iron	1.3	0.1		0.85	0.1	
Lead	0.03			0.02	0.01	0.0
Manganese	0.69	0.03	0.03	0.75		
Mercury (ppb)	6			6.2		
Nickel	0.1	0.1	0.2	0.12	0.05	0.0
Silver	0.005	0.005	0.005			
Zinc	0.8	0.1		1.05	0.05	0.0
Alkalinity	140	65	120	120	80	135
Chloride	10	12	60	150	4	49
Flouride	0.2	0.2	0.1	0.3	0.3	0.2
Phosphate	NA	NA	NA	1.6	0.07	0.0
Sulfate	290	950	1300	1600	250	270
Hardness	<b>4</b> 20	1000	1400	1600	340	350
COD	250	33	52	460	26	45

NOTE: All results in ppm unless noted otherwise. Blanks indicate below detection limit. NA indicates parameter not analyzed.

to the northern portion of the site which amounts to approximately 25 percent of the site area.

Technos, Inc. of Miami, Florida was contracted to perform the geophysical investigation. This investigation was completed in June 1983. Results of the geophysical investigation identified the probable limits of landfilling and burial zones of relatively large concentrations of iron bearing materials such as drums or car bodies. These iron bearing zones were found in several distinct locations in the north-central and western portions of the study area.

Following the geophysical investigation, a drilling/sampling program was conducted to determine if subsurface soils were contaminated. The program consisted of drilling 18 test borings through the landfill, and collecting 35 soil samples for full priority pollutant analysis, as designated by USEPA. Subsurface soil samples were collected at depths ranging from 10 to 26 feet. Sample locations are shown in Figure Q-2. Analytical data for the soil samples are shown in Table Q-4, which consists of five pages. As can be seen in the table, a wide variety of organic compounds were detected at high concentrations in these samples. The sample analysis consisted of testing for 112 organic compounds, and 63 compounds were confirmed to be present in the subsurface samples.

Specifically, the data showed that thirty-four organic compounds were found at concentrations of 10 ppm or greater. Of these 34 compounds, 20 compounds were detected at concentrations 100 ppm or greater. And of these 20 compounds, 7 compounds were detected at concentrations of 1000 ppm or greater. Compounds detected at concentrations of 1000 ppm or greater include 2,4-dichlorophenol, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, bis(2-ethylhexyl) phthalate, toluene, o-xylene, and PCB-1260. In addition, 2,3,7,8-TCDD was detected in two samples (B4B and B8B). Compounds detected in samples taken from Site Q include many of the same compounds as detected in samples taken from Site R, the Sauget Toxic Dump site. Contamination was detected

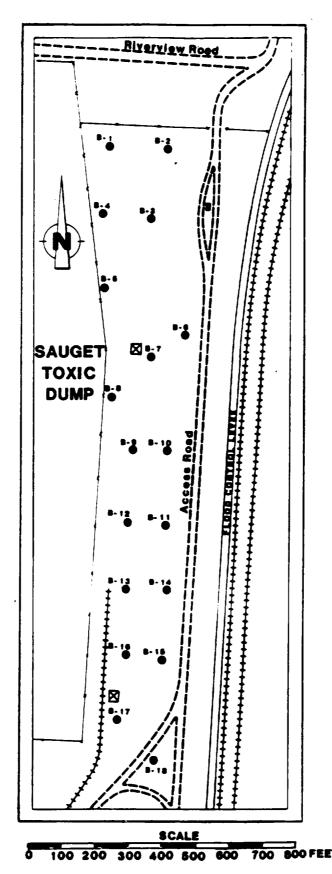


FIGURE Q-2
USEPA - FIT SUBSURFACE SOIL SAMPLING LOCATIONS AT SITE Q

# TABLE Q-4: IDENTIFIED DRGANIC COMPOUNDS IN SUBSURFACE SOIL SAMPLES FROM SITE Q (SAMPLES COLLECTED JULY 13, THROUGH JULY 20, 1983 BY ECOLOGY AND ENVIRONMENT, INC.)

# BORING/SAMPLE HUBBER

·				DEPTH (an	feet)			
	BIA	919	82A	828	834	8.78	844	540
PARAMETERS	10.0-11.5	17.5-19.0	13.5-15.5	17.0-19.0	10.0-12.0	13.5-15.5	10.0-12.0	13.5-15.
2, 3, 7, 8-1CDO								3.31
2,4,6-truchlorephenol	2, 500	170,000	22,000	520	1,400	1,500		94,000
2-chlorophenel	24,000	45,000	800		1,500	L†	57,000	360,000
2,4=dichlorophenol	<del>66</del> , 000	3, 100, 000	31,000	1700	760	4, 500		370, 000
2,4-dimethyphenol			500					72,000
4,6-dinitro-2-asthylphenol								
pentachlorophenol		86,000	5, 400	LT		11,000		100,000
phenol	24,000	55,000	45,000	4,400	3,200	100,000	90,000	88,000
2-methylphenol-								
4-asthylphenol			LT		560	LT		330,000
2,4,5-trichlorophenol				LT				
acenephthene			1,200	2, 900			_	
1,2,4-trichlorobenzene				460			LT	100,000
1,2-dichlerobenzene	ŁT		LT.			LT		20,000
1,4-dichlorobenzene			1,800	720	LT	760	LT	66,000
fluoranthene				1,200				LT
1 sophotone								
nepthelene			11,000	8, 300				LT
nitorbenzene		8, 800	400					56, 000
N-nitrosodiphenylamine				. •				
bis(Z-ethylhexyl)phthelate				LT				62,000
butyl benzyl phthelete	LT							LÍ
di-n-butyl phthelete	LI							LI
di-n-octyl phthelate								
diethyl phthelete								
benzo(a)anthracene								
benzo(a)pyrene								
benzo(b)fluorenthene			•					
benze(k)fluorenthene				400				
chrysens enthracens				400				
benzo(ghi)perylene				3,000				LT
fluorene phenenthrene			400 1,000					LŤ
dibenzo(e,h)anthracene			1,000	2,700				Li
indene(1,2,3-cd)phrene			LT	LT -	<del></del>			LŤ
pyrene eniline			L)	Li				Li
4-chlorenalane			LT					
dibenzofuren			1.000	3,000				
2-esthylnepthalene			2,000	2,300				
3-nitroeniline			4,600	2, 500				
			4, 600					
benzene Chl grabenzene		<del></del>	<del></del>	<del></del>			10,000	40,000
1.2-dichloroethene							10,000	40,000
1,1-dichloroethene								
1,1-dichioroethene								
1,1,2,2-tetrachioroethene								
ethylbenzene								
ethylene chloride			7.4	3.7	LM	6.0		
tetrachloroethene			/,•					
toluene								
trichloroethene								
acetone			960			977		UH
2-but anone			,			•••		
4-eathy1-2-centanone						LT.		
styrene						••		
0-xylene	<del></del>			2.0				5,100
PCB-1242								-,
	1, 000							
PCB1254 PCB-1246 PCB-1240	1,000		445 7		4.04			
	1,000		485.2 2,120.6		69.6			

NOTE: All results in ppb.

LT x Present, but lower then the detection limit for low hezerd enalyses.

LM x Present, but lower then the detection limit for medium hezerd enalyses.

Px The sample could not be cleaned up sufficiently to yield TCDD results.

MA x Not analyzed, emaple could not be cleaned up sufficiently.

Blank x not detected.

# BORING/SAMPLE MARGER

				Depth (1	n feet)		·	
	BSA	839	964	14	87A	878	884	166
PARAMETERS	13.5-15.5	17.0-19.0	10.0-12.0	13.5-15.5	10.0-12.0	13.5-15.5	13.5-15.5	17.5-19.
2, 5, 7, 6-TC00								0.11
2,4,6-trichlorophenal	130,000	26,000	2, 700	4, 800	2, 700		400,000	10, 000
2-chlorophonel	31,000	8, 408	1,600	1,600	LT			
2,4=dichlerophenel	540,000	260,000	17,000	15,000	6, 100		1,500,000	64, 000
2,4-damethyphenol			2,000					
4,6-dinitro-2-mothylphonol								
pentechlorophenel				16,000	25,000	31,000		
phenel	140,000	250,000	45,000	11,000	1,800			
2-methylphenol-			1,400	400				
4-methylphenol		36,000	7,000	1,400				
2,4,5-trichlorophenol								
aconophthone								
1,2,4-trichlorobenzene	86,000	13,000					120,000	
1,2-dichlorobenzene	100,000	28,000	LT				180,000	
1,4-dichlorobenzene			3,100	800		·	·	
fluorenthene								
reabhetone		. =						
napthalane		LT	800	LŤ			300,000	LT
niterbenzene	27,000	11,000	LT				52,000	
N-nitromodiphenylemine								
bis(2-ethylhexyl)phthelete								
butyl benzyl phthelete			<del></del>					
di-n-butyl phthalate			400	LT			_	
di-n-octyl phthelete								
diethyl phtheiste								
benzo(a)enthracene								
benze(a)pyrene						LT		
benze(b)fluoranthene						LT		
benze(k)fluorenthene		<u> </u>				LT		
chrysene						LT	-	
anthracana								
benzo(ghi)perylene								
fluorene								
phenenthrone								
dibenze(e,h)enthrecene								
indens(1,2,3-cd)phrene								
pyrane								
entline								
4-chloreniline			9,000					
dibenzofuran								
2-asthylnapthelene								
3-nitroeniline								
benzene						3.2	LM	
Chlorobenzene	10,000	27,000	100,000	8.4		4.2		
1.2-dichloroethere	·•,	,	12,000	3.4		***	.,	
1,1-dichloroethene			,					
1,1,2,2-tetrachloroethane								
1,2-trans-dichlorosthens								
ethylbenzene			44,000	3. 8	ı	4.5		
			, 000	15.0				
tetrachleroethene				.,,,,,	LT			
tolvene			50,000	LT		6.1		
trichloroethene			~, 000			17		
ecetone Elicutoroscuene				330	200	2,600		
2-but shene				LT	LT	2, <b>5.0</b> 0		
4-aethyl-2-pentanene				.,	.,			
• •								
etyrene G			140,000	13.0	LT	22.0		
0-zylene	70 000		الله , س	13.0	Li	22.0	1,700	2,700
PCB-1242	70,000						1,700	2, 700
PCB1254	60,000							
PCB-1248				4, 700			***	
PCB-1260					590	13,000	980	1,500
PCB-1016		_			2,300	44,000		
Total PCB		66,000						

All results in ppb.

LT x Present, but lower then the detection limit for low hazard enalyses. LN x Present, but lower then the detection limit for medium hexard enalyses.

P = The sample could not be cleaned up sufficiently to yield TCDD results.

NA = Not analyzed, sample could not be cleaned up sufficiently.

Blank = Not detected.

### BORING/SAMPLE NUMBER

TABLECTICES   13,0-17,0   17,0-19,0   17,00		DEPTH (in feet)							
12.3.7.1.   TODO   2.4									0120
1, 4, 4, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		13.0-17.0	17.0-19.0	17,0-19.0	19.0-21.0	17.0-19.0	1 17.0-21.0	17.0-19.0	19.0-21.
2			400	44 000	440	r	•	4 400	9, 400
2, A-dischiprephenal   7, 400   9, 600   170,000   9, 60   3, 200   20,000   4, 600   4, 6-dischiprephenal   1, 4, 6-dischiprephenal   1, 500   14,000   32,000   11,000   6, 200   37,000   17,000   7, 600   7				-				-	•
1,d-cate typehenal	* · · ·		•					•	520
1, 4-50   14, 000   2, 200   24, 0		7, 400	•	170,000	7, 60	3, 200	20,000	8, 800	4, 200
percent   4,000   2,200   14,000   77			CT						
Present   7,500   14,000   32,000   11,000   4,200   37,000   17,000   7									
2au-thylphenel	•								720
		7,500	14,000	32,000	11,000	6,200	37,000	17,000	7,500
2.4.5-truchloregienol servapithies 1.2.6-truchloredeniane 1.2.6-truchloredeniane 1.2.6-truchloredeniane 1.4dathloredeniane 1.4dathloredeniane 1.5.000 LT 1.2-dathloredeniane 1.5.000 LT 1.5.000 LT 1.5.000 JA,000 Add 1.5.000 JA,000 Add 1.5.000 JA,000 Add 1.5.000 JA,000 Add 1.5.000 JA,000 Add 1.5.000 LT 1.5.00									
1,2,4-trelnordenzene		1,400	2,700	2,700				1,000	720
1,2-dishlerobearane									
1,2-d-shelperobenzene 1,7,000 1,7 1,3-d-shelperobenzene 1,7,000 1,7 1,3-d-shelperobenzene 1,7,000 1,7 1,3-d-shelperobenzene 1,7,000 1,7 1,000 1,000									
1, act anthere   17,000   17   17,000   17   17,000   1				•					
	•	•	•						800
Importance   17,000	<del></del>		LT	27,000		<u></u>			1,000
Augustiane   Aug	7 aprenthene								
ALLE THE PRINTED   PRINTED	7 ambustane						LT		720
he_itrosediphenylamine   Lit   Lit	nepthelene			6, 500		72,000	35,000	LT	640
1	n1:arbenzene								
Sut-V   Denzy    phthalate	h-mitrosodiphenylamine						LT	LT	
	bis 2-ethylhexyl)phthelate	440				52,000	34,000	440	
Gi	but-1 benzyl phthelete					LT			
distry  phthelate   barza(a)enthreceme   barza(a)enthreceme   barza(a)enthreceme   barza(a)enthreceme   barza(b)flucrenthome   1	di-n-butyl phthelete		1,500	LT		23,000	LT		
berz2(a)enthrecene   berz2(a)eprene   berz2(a)eprene   berz2(a)eprene   berz2(a)eprene   berz2(b)fjuerenthene   1	dioctyl phthelate								
berizo(a)pyrene	distryl phthelate	LT	640						
berizo(b)flueranthene   1   1   1   1   1   1   1   1   1	ber.zo(a)anthrecene								
Instructive   Instruction	ber.20(8)pyrene								
Instructive   Instruction	benzo(b)fluorenthene								1,000
### ### ##############################	berzo(k)fluorenthene								1,000
Description   Description	Cythagus					6,400			
Fluorene	ant's scene								
Fluorene	berzp(ghi)perviene								
pharmathrene									
dibenzo(a,h)enthracene						5,200			
pyrams anilne d-cloranilne dibenzofuran 2-esthylnepthalare 3-citrosnilne benzene LM  Chiprobenzene 1,2-dichlerosthare 1,1-dichlerosthare 1,1-dichl	-								
### ##################################			******			5, 400			
### ##################################						-,			
dimensofurem   2-methylnapthalane   10,000   3itromnilane   10,000   3itromnilane   10,000   3itromnilane   10,000   3itromnilane   10,000   3itromnilane   3,200   3itromnilane   3,200   3itromnilane   3,200   3itromnilane   3,300									LT
2-methylnapthalane 3itromiline berzere  Chi probanzane 1,2-dichlarosthare 1,1-dichlarosthare 1,1-dichlarosthare 1,1-trans-dichlarosthare 1,2-trans-dichlarosthare 2,2-trans-dichlarosthare 3,3 300 8,700 LT  tetrachlorosthare talums 130,000 1,300,000 100,000 trunhlorosthare talums 210 14,000 4,400 2-butanone 4-methyl-2-pentanone 8tyrene 0-mylane 30,000 650,000 70,000									-
3tromaline berzene  Chi probenzene 1,2-dichloroethere 1,1-dichloroethere 1,1-dichloroethere 1,1-trans-dichleroethere 1,2-trans-dichleroethere 1,2-trans-dichleroethere 1,3,3 300 8,700 LT  tetrachloroethere telians 130,000 1,300,000 100,000 trinloroethere telians 210 14,000 4,400 2-butanone 4-authyl-2-pentanone 8tyrene 270 30,000 650,000 70,000	_					10,000			
Discrete   Discrete						.0,000			
Chi probenzene				t.m					
1, 2 - dichlorosthere 1, 1 - dichlorosthere 1, 1, 2, 2 - tetrachlorosthere 1, 2, 2 - tetrachlorosthere 1, 2, 2 - tetrachlorosthere 1, 2 - teme-dichlorosthere 1, 2 - teme-dichlorosthere 1, 2 - teme-dichlorosthere 1, 2 - teme-dichlorosthere 1, 3 - 3 - 300						1.10		·	
1,1-dichloroethene 1,1,2,2-tetrachloroethene 1,2-trene-dichloroethene 1,2-trene-dichloroethene 1,2-trene-dichloroethene 1,2-trene-dichloroethene 1,2-trene-dichloroethene 1,300				-,		<b></b>			
1,1,2,2-tetrachleroethene 1,2-trame-dichleroethene 1,2-trame-dichleroethene 21-ylbenzene est-ylene chloride 3,3 300 8,700 LT  tetrachloroethene tal.ams 130,000 1,300,000 100,000  truchloroethene acetone 210 14,000 4,400  2-butanone A-authyl-2-pentanone 8tyrene 0-mylene 30,000 650,000 70,000									
etrylbenzene									
### ### ##############################	1,2-trans-dichleroethene								
tetrachloroethene telans 130,000 1,300,000 100,000 trachloroethene 42,000 acetone 210 14,000 4,400 2-butanone 4-authyl-2-pentanone styrene 30,000 650,000 70,000				6,500	. •	220,000			
tel_mme		3,3		a, 700	Łĭ				
trichloroethene				130.000		1, 300, 000	100.000		UI
ace tone 210 14,000 4,400 2-but anone 4-authyl-2-pent anone 8t yrane				. ~, •••			,		
2-but anone		210	14,000		4, 400	-,			
4-earthyl-2-pentanene styrene 50,000 70,000			-,		• -				
0-m-lane 30,000 650,000 70,000								LT	
						650,000	70,000		U
PCB-1242 600 MA		600							
PCB 1254 NA 30,000 70,000						30 000	20.000		
		1 600	1 100		120			7, nnn	5,000
PCB-1260 1,500 1,300 NA 120 45,000 681,000 7,000 5,		1, 700	.1, 200		120	47,000		,, 000	,, 555

All results in ppb. LY x Present, but lower than the detection limit for low hazard analyses. UP x Present, but lower than the detection limit for medium hazard analyses. P x The sample could not be cleaned up sufficiently to yield TCDD results. MA x Not enalyzed, sample could not be cleaned up sufficiently. Blank x Not detected.

### BORING/SAMPLE NUMBER

<del></del>			<del></del>	Depth (in	feet)	·		<del>,</del>
	B13A	8130	8144	8146	B15A	8138	B164	B17A
PARAJETERS	17.0-19.0	19.0-21.0	17.0-19.0	19.0-21.0	22.0-24.0	24.0-26.0	22.0-24.0	22.0-24.
2, 3, 7, 8-TCBD								
2, 4, 6-trichlorephonel	20, 000	4, 600			800	1,900	7, 700	6, 400
2-chlorophonel	2, 500	3, 800			600	1,400	4, 600	100,000
2, Audichlerophenel	7, 400	11,000	440,000			11,000	27,000	120,000
2, 4-dusethyphenol		LT					680	
4,6-dinitro-2-esthylphonol	LT							
pentechlorophenel	12,000	44, 000	16,000	16.000	4, 200	12,000	39, 000	26, 000
phenol	6,900	15,000			6,000	13,000	16,000	50,000
2-anthylphonol-								
4-methylphonel	720	1,400		16,000		1,000	1,900	9, 200
2,4,5-trichlorophenel							LT	
acenephthene								
1, 2, 4-truchlorobenzene	2, 400	3,000	13,000,000	2,000,000				
1, Z-dichlorobenzene			<b>420,000</b>	55, 000			LT	
1_4-dichlarabenzene	1,300	2,000	1,200,000	100,000		1,600	4,100	
fluorenthene								
7 gobyo Laue		_		14,000				
nepthelene		LT	210,000	20,000		720	2,000	
niterbenzene								
N-nitrocodiphenylamine		400	4 400					
bis(2-ethylhexyl)phthelate			1, 100, 006	220,000			4, 600	
butyl benzyl phthelete				LT		LŤ		
di-n-butyl phthelete		LT	900, 000	49,000	LT	3, <b>80</b> 0		
di-n-actyl phthelete		LT						
diethyl phthelete						LT		
benzo(a) enthe econo								
benzo(e)pyrene	LT							
benzo(b)fluroranthene	1,300*							
benze(k)flureranthene	1,300+							
enthrecene								
benzo(ghi)perylene	880							
fluorene								
phenenthrene								
dibenzo(e,h)enthrerene	LT							
indeno(1,2,3-cd)phrene	LT							
pyrene								
enaline							640	
4-chlorenzline	LŤ	2, 200					7, 600	
dubenzofucan	-	-,					,,	
2-asthylnepthalene				LT				
3-nitreeniline				•				
benzene			44,000					
Chi propenzene			63,000	LH				•
1.2-dichloroethune			,	_,				
1,1-dichloroethane			19,000					
1, 1, 2, 2-tetrachloroethane			5, 700					
1,2-trane-dichloroethene			11,000					
ethylbenzene			790,000	330,000	LT			
anthylene chloride	50.0	13.0	•	•	2.5	23.0		LM
tetrachloroethene			12,000					
teluene			2,400,000	540,000				
trichlorosthune			55,000					
acetene	90.0	430			540	1,400		
2-butanene			LH					
4-eathy1-2-pentanene		LT	250,000		LT			
styrene				_64,000	4.2	5.3		
0-xylene			2, 300, 000	1,400,000		LT		
PCB-1242						5,000		
PCB1254								
PCB-1246		-						
	770	1, 300	2, 900, 900	16,000,000	190	1,000	370	68.0
FCB-1260	//4	.,,	-,,					
PCB-1260 PCB-1016	770	.,,,,,,	2,700,000	15, 555, 555	210	•		

All recults in ppb.

LT  $\pi$  Present, but lower than the detection limit for low hexard analyses. LH - Present, but lower than the detection limit for medium hexard analyses

P = The sample could not be cleaned up sufficiently to yield TCDD results. NA = Not enalyzed, easple could not be cleaned up sufficiently. Slank = Net detected.

#### TABLE 9-4 (Continued)

BORING/SAMPLE NUMBER

				Depth (10	foot)		
PARAMETERS	8178 24.0-26.0	818A 22.0-24.0	81 <b>68</b> 24.0-26.0	Blank 1	Blank 2	Sp.1 km 61.0 ppb 0.37	Spike @1.0 ppb
2,3,7,8-TCDD						0.37	@1.0 ppb 0.91
2,4,6-trichlorophonol							
2-chlorophonol							
2,4mdichlorophenol	3, 800						
2,4-disethyphenel							
4, 6-dinitro-2-methylphenol							
pentachlorophenol							
phenol							
2-aethylphenol-							
4-eethylphenol							
2,4,5-trichlorophenol econophthene							
1,2,4-trichlorabenzene							
1,2-dichlorobenzane							
1,4-dichlorabenzene	550		LT				
fluorenthene				<del></del>	1,000		
1 sochotone					1,000		
napthelene							
nitorbenzene							
N-nitrocodiphenylamine							
bis(2-ethylhemy1)phthelete	580	910	1,400	LT.			
butyl benzyl shthelete	,	710	,, 400				
di-n-butyl phtheists			- 11			-	
di-n-octyl shthelete		LT	•				
diethyl phthelete		,					
benzo(e)enthrecene		520			600		
benzo(s)pyrene		760			LT		
benzo(b)flu		LT			ĹŤ		
benzo(k)fluorenthene		ίŤ			ίŤ		
chrysene		640	·		340		
enthrecene					,		
benzo(ghi)perylene							
fluorene							
phononthrone					720		
dibenzo(e,h)enthrecene							
indeno(1,2,3-cd)phrene							
pyrene		LT			800		
aniline	51,000	1,700					
4-chioraniline	,	960					
dabenzofuran							
2-asthylnepthelene							
3-nitroeniline			•				
benzene							
Chlorobenzene	4,1						
1,2-dichleroethene							
1,1-dichleroethene							
1,1,2,2-tetrachloroethane							
1,2-trans-dichlorosthans							
ethylbenzene	7.7						
methylene chlorade	6.1	19.0	47.0	LM	6.9		
tetrachloroethene			-				
telumne							
truchloroethene							
acetone	2,000		260				
2-but enene							
4-methy1-2-pentanone							
etyrene							
0-xylene	23.0			·			
PCB-1242	Ì						
PCB1254							
PCS-1248							
PCB-1260	160		2,400		260		
PCS-1016							
Total PCB		670					

Q-15

All results in ppb.

IT = Present, but lower then the detection limit for low hazard analyses.

UE = Present, but lower then the detection limit for madium hazard analyses.

P = The mample could ot be cleaned up sufficiently to yield TCDD results.

NA = Not analyzed, mample, could not be cleaned up sufficiently.

Blank = Not detected.

across the entire area investigated, which suggests that disposal of large quantities of chemical wastes occurred specifically in the northern portion of Site Q and probably over the entire site area.

# Data Assessment and Recommendations

The data developed to date for Site O shows significant overall contamination at the site. Leachate samples collected from the west-central portion of the site contained phenols, PCBs, and several Data collected prior to 1980 show general degradation of water quality, as evidenced by the analysis of leachate and pond water samples. The cinders and flyash used as cover material over the entire site have been shown to contain elevated levels of heavy metals, and also to be highly permeable. The subsurface soil investigation conducted in 1983 indicated widespread organic contamination to a depth of 26 feet in the northern portion of This study provides the only depth and area-specific information available for the site concerning chemical contamination. Since the 1983 study was limited to approximately 25 percent of the total site area, it is apparent that further investigation is necessary for Site Q.

Field activities presently scheduled at Site Q for the Dead Creek Project include the installation and sampling of seven monitoring wells and ambient air monitoring. This would provide limited information concerning overall site contamination, but would not be adequate to permit a detailed feasibility study of specific remedial options. Further field activities should include additional geophysical investigations and subsurface soil sampling for areas not covered in the 1983 investigation, plus infiltration tests, hydraulic conductivity tests, ground water monitoring, and an assessment of the ground water hydrology in relation to the river.

The proposed geophysical surveys should be conducted in both on- and off-site areas to delineate any off-site migration of contaminant plumes and other possible drum burial areas. Infiltration tests would be conducted at several locations to determine the adequacy of

cover material, and to provide an estimate of leachate production. The ground and surface hydrology should be assessed over a period of time sufficient to address seasonal fluctuations. This assessment would provide data to determine ground water discharge and recharge in relation to the river. Additional investigation, if necessary, would be proposed following the completion of these activities.

# Site Description

Site R is the Sauget Toxic Dump, an inactive industrial waste landfill used by the Monsanto Chemical Company between the years 1957 and 1977. Site R occupies approximately 36 acres adjacent to the Mississippi River in Sauget, Illinois. The site is located immediately west of Site Q, commonly known as the Sauget Landfill. Site R is presently covered with a clay cap and vegetated, and drainage is directed to ditches around the perimeter of the site. A Monsanto feedstock tank farm is located adjacent to the site on the northwest side.

# Site History and Previous Investigation

Site R, also known as the Krummrich Landfill, was operated by Sauget and Company under contract with Monsanto. According to an Eckhardt Report summary sheet submitted in 1979 by Monsanto, approximately 262,500 tons of liquid and solid industrial wastes were disposed of at Site R from Monsanto plants in Sauget and St. Louis. In 1981, Monsanto submitted two Notification of Hazardous Waste Site Forms for Site R to the USEPA. The Monsanto W.G. Krummrich Plant (Sauget) listed 290,000 cubic yards (c.y.) of organics, inorganics, solvents, pesticides, and heavy metals as having been disposed at Site R. The Monsanto J. F. Queeny Plant (St. Louis) listed 6600 c.y. of the same waste types as above. Both notifications also indicated belowground disposal of drums.

Monsanto has also submitted two reports to IEPA outling waste types and volumes disposed of at Site R for the years 1968 and 1972. Data compiled from these reports are summarized in Table R-1. This tabulation shows that the volume of wastes landfilled in 1972 was significantly lower than that in 1968. This reduction reflects the elimination of several major production operations at Monsanto's Krummrich Plant. By 1975, the majority of chemical waste disposal at

TABLE R-1: A LISTING OF WASTE TYPES AND APPROXIMATE QUANTITIES DEPOSITED AT SITE R AS REPORTED BY MONSANTO

Approximate Annual Volume (Cubic Yards) 1968 1972 Still Residues From Distillation of: Nitroaniline and Similar Compounds 1700 94 Cresols, Esters of Phenol 1140 Chlorophenol, Chlorophenol Ether 1070 774 Aniline Derivatives 1300 208 Chlorobenzol 130 13 Nitro Benzene Derivatives 100 1190 Pheno1 1020 Aromatic Caboxylic Acids 1500 425 Chlorinated Hydrocarbons By Products Mixed Isomers of Nitrochlorobenzene 1700 785 Mixed Isomers of Dichlorophenol 3000 1240 730 Waste Maleic Anhydride Waste Chlorobenzenes and Nitrochlorobenzene 120 Contaminated Acids and Caustic Waste Sulfuric Acid with Chloropenol Present 1500 1395 Waste Caustic Soda with Chlorophenol Present 5300 1760 Waste Solvents 600 Waste Methanol Contaminated with Mercaptans Waste Isopropanol (Water and Chlorinated Hydrocarbon) 5500 Miscellaneous Solvents 1019 Oily Material 101 Filter Sludges Spent Carbon or Other Filter Media 600 12 1195 Lime Mud from Nitroaniline Production 1000 5600 Gypsum Obsolete Samples and Sampling Wastes 72 40 Chlorophenols 208 150 Laboratory Samples Total 16,021 28,270

NOTE: Blanks indicate waste type not reported.

Site R had been terminated, as wastes were either hauled to other disposal facilities or incinerated on the plant site.

Very little information is available concerning disposal activities at Site R prior to 1967. In March, 1967, Sauget and Company filed an application for registration to operate a refuse disposal facility to the Illinois Department of Public Health. Health Department inspection reports from 1967 indicate disposal of liquid chemical wastes and metal containers from Monsanto. Liquids were pumped from tank trucks and drums into several pits around the site. Cinders were used as intermediate cover material.

In August, 1968, the Illinois Department of Public Health collected five ground water samples from on-site monitoring wells. The locations of these wells are shown in Figure R-1, and analytical results are presented in Table R-2. Phenols were detected in all wells at concentrations ranging from 15 to 1220 ppb. Alkalinity and total solids were also analyzed for, but no significant conclusions can be made from the data for these parameters.

IEPA began making routine inspections at Site R in 1971. Photographs of the site at this time suggest that wastes were disposed of in direct contact with the ground water. No segregation of liquid wastes was apparent in these photographs. IEPA collected another set of samples from the monitoring wells in December, 1972. Analytical data for these samples are shown in Table R-3. The results indicate concentrations of iron, zinc, and phenol above the State's water quality standards. Oil was also detected in wells MW-1 and MW-4. Samples were also collected from waste ponds at Site R by IEPA in January, 1973 and analyzed for phenol. Two samples were collected from pits identified as crystallization ponds, and one sample was taken from a spent caustic pond. Results for the waste pond samples are shown in Table R-4. High concentrations of phenols were detected in all samples.

In 1973, IEPA sent notices to Sauget and Company and Monsanto

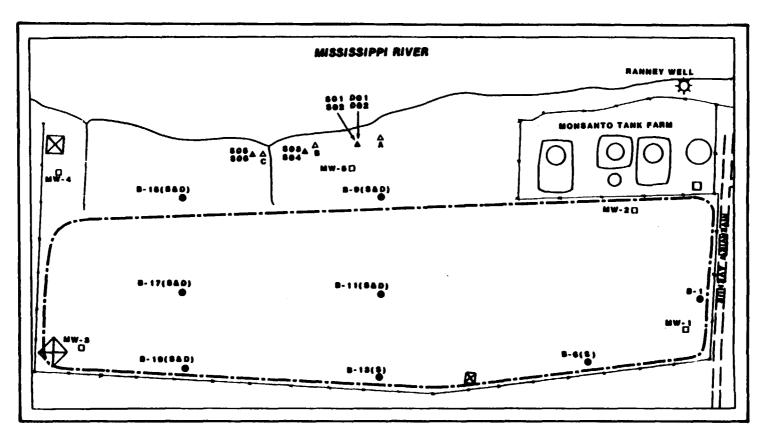




FIGURE R-1 STATE AND USEPA SAMPLING LOCATIONS AT SITE R.

TABLE R-2: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED AUGUST 22, 1968 BY THE ILLINOIS DEPARTMENT OF PUBLIC HEALTH)

PARAMETERS	MW-1	MW-3	MW-4	MW-5	MW-6
Total Solids (conductivity mmhos) Alkalinity (ppm)	320 172	300 148	280 156	250 124	500 248
Phenol (ppb)	1220	25	20	15	1200

TABLE R-3: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED DECEMBER 5, 1972 By IEPA)

		SAMPLE LOCA	110N2	
PARAMETERS	MW-1	MW-2	MW-3	MW-5
Calcium	50.2	147	36	49
Magnesium	15.8	36	18	18.5
Sodium	18.5	112	15	18.5
Potassium	3.6	6.7	4.2	3.5
Ammonia	1.5	2	0.65	0.92
Arsenic				
Boron	0.1	0.7	0.1	0.1
Cadmium	-			
Chromium (Total)				
Copper		0.1		
Iron	2.4	28.2	1.4	8.5
Lead				0.02
Manganese	0.35	0.61	0.12	0.95
Mercury				
Nickel				
Zinc	0.40	1.42	0.21	2.05
Alkalinity	180	430	145	185
Chloride	22	225	22	22
Fluoride	0.2	0.2	0.2	22
Nitrate	0.1	0.3	0.1	0.1
Phosphate	0.003	0.21	0.05	0.34
Sulfate	16	12	29	32
Conductivity (mmhos)	445	1400	390	470
Phenols	0.088	0.2	0.007	0.014
Oil	I	0	1	0
Hardness	200	530	170	200
COD	46	135	3	8

NOTE: All results in ppm.

Blanks indicate below detection limits.

TABLE R-4:

ANALYSIS OF SURFACE WATER SAMPLES FROM WASTE PONDS AT SITE R (COLLECTED JANUARY 18, 1973 BY IEPA)

SAMPLE LOCATIONS

	· · · · · · · · · · · · · · · · · · ·	SAIN EE EOOKI TONS	
PARAMETER	CRYSTALLIZATION POND 221	CRYSTALLIZATION POND 270	SPENT CAUSTIC POND
Phenol	2800	50,000	2,000

NOTE: Results in mg/l (ppm).

outlining violations of the Environmental Protection Act at Site R. Violations noted included inadequate segregation of wastes, open dumping of chemical wastes, and operation of a disposal facility without the necessary permits. In addition, it was noted that the cinders being used as cover material was not in accordance with the Rules and Regulations set forth by the Illinois Pollution Control Board. These violations were reiterated several times in 1973 and 1974.

The monitoring wells at Site R were sampled annually between the years 1973 and 1976. In addition to the monitoring wells on site, a Monsanto production well (Ranney Well), located in the northwest corner, was also sampled. Results from these sampling efforts are summarized in Tables R-5 through R-8. Although specific pumping data for the Ranney Well could not be located, Illinois State Water Survey reports and file information suggests that pumpage of the well produced a significant cone of influence in the area. Sample data shows significant contamination in the Ranney Well, most notably with phenols and PCBs. COD, which is a non-specific indicator of organic contaminants, was also detected at much higher concentrations in the Ranney Well than in other wells sampled. Iron, mercury, and zinc exceeded water quality standards on one or more occasion during this time period. It should be noted that analysis of samples collected at Site R prior to 1976 was limited to inorganic parameters and Ground water samples collected in February, 1976 were phenols. analyzed for PCBs (Table R-8). The Ranney well was the only well to show a detectable concentration of PCBs (7.7 ppb).

IEPA monthly inspection reports from 1975 indicate a significant reduction in the volume of chemical waste disposal at Site R. Wastes were being shipped to other locations for disposal or were being incinerated at Monsanto's Krummrich Plant. Monsanto voluntarily ceased disposal operations at the site in 1977 and began closure proceedings. D'Appolonia Consulting Engineers, Inc. (D'Appolonia) was contracted by Monsanto to conduct a subsurface investigation of the site. Twenty soil borings were drilled and eight monitoring

TABLE R-5: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED FEBRUARY 22, 1973 BY IEPA)

<del></del>						
PARAMETERS	MW-1	MW-2	MW-4	MW-5	RANNEY WELL	
Iron	6.8	11	0.8	6.6	1.9	
Manganese	0.35	0.55	0.05	1.05	0.92	
Mercury (ppb)	0.4			0.2		
Zinc	1.9	0.6		1.5		
Ammonia .	1.6	2.6	0.7	1.3	0.98	
Phenol (ppb)	150	80			7500	
BOD	31	48	1	1	85	
COD	51	78	16	13	220	

NOTE: All results in ppm unless noted otherwise. Blanks indicate below detection limits.

TABLE R-6: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED MAY 6, 1974 BY IEPA)

<del></del>	<del></del>			C COO!!!!	<del></del>	
PARAMETERS	MW-1	MW-2	MW-3	MW-4_	MW-5	Ranney Well
Arsenic	0.001	0.001	0.005		0.001	0.002
Barium	0.1	0.3	0.2	0.1	0.2	0.2
Boron	0.3	0.9	8.4	0.2	0.1	
Cadmium		0.02				
COD	44	990	21	14	17	340
Chloride	90	215	30	17	16	25
Cyanide		0.008				0.005
Iron	15	43.2	11.9	2.71	7.5	2.65
Lead	0.008	0.01		0.008	0.014	0.95
Manganese	0.69	1.4	1.1	0.2	0.9	0.95
Nitrate						0.4
011	4	7	1			5
Phenols	0.35	120	0.1	0.02	0.1	15
R.O.E.	720	1600	750	270	240	820
Selenium						
Sulfate	220	78	305	48	41	31

NOTE: All results in ppm.

Blanks indicate below detection limits.

TABLE R-7: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED OCTOBER 28, 1975 BY IEPA).

<del></del>	<del></del>	SAIN LE LO	3/11/2013	<del></del>
PARAMETERS	RANNEY WELL	MW-2	MW-4	MW-5
Ammonia			•	
Arsenic	0.002		0.002	
Barium	0.1	0.1	0.1	0.2
Boron	0.7	0.9	0.5	0.2
Cadmium			- · · ·	
COD	345	210	12	16
Chloride	110	200	23	20
Cyanide		0.02	0.01	
Iron	4.5	13.4	1.45	11
Lead	0.02		0.01	0.04
Manganese	1.3	0.2	0.1	0.7
Nitrate		0.3	0.2	0.1
011	3	6	2	3
Pheno1	19	1.1	0.025	0.013
R.O.E.	300	920	230	200
Selenium	0.02			
Sulfate	95	6	22	15

NOTE: All results in mg/l, (ppm).
Blanks indicate not detected.

TABLE R-8: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED FEBRUARY 17, 1976 BY IEPA)

PARAMETERS	MW-1	MW-2	MW-3	MW-4	MW-5	RANNEY WEL
Arsenic						0.001
Barium				0.2	0.3	0.1
Boron	0.3	0.8	8	0.5	0.1	1.4
Cadmium	i					
COD	28	130	8	16	15	390
Chloride	60	410	65	35	35	250
Cyanide	0.01	0.01	0.01	0.01	0.01	0.01
Iron	5.1	19.5	4.3	0.7	7.1	4.6
Lead	0.01	0.02			0.02	
Manganese	0.27	0.27	0.1	0.1	0.85	1.45
Nitrate	0.8	0.1				0.3
Phenols	0.03	0.01				
ROE	370	890	260	220	260	900
Selenium .						
Sulfate	110	20	100	44	36	180
PCBs (ppb)	•					7.7

NOTE: All results in mg/1 (ppm) unless noted otherwise. Blanks indicate below detection limits.

wells were installed. The D'Appolonia study concluded that the landfill area consisted of 5 to 20 feet of flyash, cinders, silty clay, and unidentified waste. The landfill is underlain by alluvium, consisting of fine sands, silt, and clay ranging in thickness from 5 to 50 feet. Field permeability tests showed that alluvium is fairly permeable (1 x  $10^{-3}$  cm/sec) suggesting that silty sand is the major component of the alluvium. This finding is supported by the evidence of vertical migration of contaminants to a depth of 65 feet, as suggested in the boring logs. Water levels were generally 25 to 30 feet below ground surface.

In May, 1978, Monsanto filed closure documents to IEPA detailing a closure plan for the site. In general, the plan consisted of specifications for the installation of a drainage system and clay cap, along with details for grading, seeding, and access restriction. The Helmkamp Construction Company was retained to implement the closure plan. An IEPA inspection report from October, 1979 indicated that closure operations at Site R were complete, including installation of a clay cap 3 to 6 feet in thickness. In February, 1980, Richard Sinise, an Environmental Control Engineer for Monsanto, filed an Affidavit of Closure for Site R.

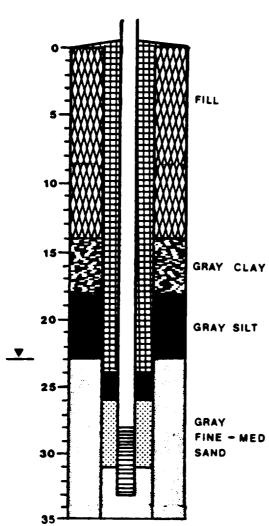
IEPA personnel collected ground water samples from monitoring wells installed by D'Applonia in October, 1979 (Figure R-1). The samples were analyzed for inorganics and organic parameters reported by Monsanto to have been disposed of at the site. Analytical results for these samples are shown in Table R-9. Analysis showed the presence of several organic contaminants in the wells. Both shallow (25 to 35 feet) and deep (60 to 70 feet) wells were sampled, and chlorotoluene and phenol were found in all wells sampled. Well B-19S, located in the southeast portion of the site, also showed chlorophenol, dichlorobenzene, and diphenyl ether at concentrations ranging from 0.81 to 2.1 ppm. Iron, copper, and zinc exceeded water quality standards in several wells. Another set of samples was

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-19-67
	Tim Maley

Depth (ft)

Description





Tagabian 2164 4	V-1/88-00
Location Site C	
Owner IEPA	
Top of Inner Casi	ng Elev. 423.51
rilling Firm	ox drilling
riller Jerry W	lamon
tart & Complete	mmon
ype of Rig Mob	11a B-61
The or wid Woo	1774 B_01
athed of Builtin	2 - 1 1 1 1 1 1 F
eruod of Dillin	g <u>3 3/4" I.D.</u>
hollow stem aug	ers
	L DATA
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oring Depth35	Diem. 2 in.
asing and Screen	D10m 2 ln.
creen Interval	28 - 33 Ft.
	less steel 0.01" slot
Stickup 2.3 ft.	
fell Typemonit	oring
Aeti Courtiaction	1:
Pilter Pack	33 - 26 ft.
Seal 26 - 24	33 - 26 ft. ft.
Grout 5 ft. Lock No. 283	to surface
Lock No. 283	4
	ST DATA
Static Water Elev	7. 395.53 Date 3-26-87 7. 394.42 Date 5-11-87
tatic Water Elev	. 394.42 Date 5-11-87
lug Test	Yes X No
est Date 5-11-	-87
rdraulic Conduct	ivity 2.2 x 10 cm/eac
ther pH = 7.0	
Cond. = 4400 um	hos Temp. = 56° F
Yellowish, turb	id
	QUALITY
Samples Taken	Yes Y No
in of Comics	Yes X No 1 round groundwater
where of descise	a round
Abas or sembres	Atonugaetet
late Campled 3-	16_47
Date Sampled 3-	16-87
tamplers E E E	16-87
Samplers E & E E samples Analysed	for HSL compounds
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ate Sampled 3- samplers E & E samples Analysed	for HSL compounds
emplers E E E	for MSL compounds
Samplers E & E Samples Analysed  Split Samples	for MSL compounds  Yes No X
amples B & E amples Analysed	for MSL compounds
amples E & E amples Analysed  plit Samples ecipient	for MSL compounds
Samples Analysed  Split Samples Recipient	for MSL compounds
Samples Analysed  Split Samples Recipient	for MSL compounds
Samples Analysed  Split Samples Recipient	for MSL compounds
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Samples E E E Samples Analysed  Split Samples Recipient  Comments	for <u>H\$L compounds</u> Yes <u>No X</u>
Samples E & E Samples Analysed  Split Samples Recipient  Comments	for HSL compounds
Samples E E E Samples Analysed  Split Samples Recipient  Comments	for <u>H\$L compounds</u> Yes <u>No X</u>
Samplers E & E Samples Analysed  Split Samples Recipient  Comments	for <u>H\$L compounds</u> Yes <u>No X</u>
Samplers E & E Samples Analysed  Split Samples Recipient  Comments	for <u>H\$L compounds</u> Yes <u>No X</u>
Split Samples Recipient Comments	for <u>H\$L compounds</u> Yes <u>No X</u>
Samples E & E Samples Analysed  Split Samples Recipient  Comments	for <u>H\$L compounds</u> Yes <u>No X</u>
Samples E & E Samples Analysed Split Samples Recipient Comments	for MSL compounds Yes No X

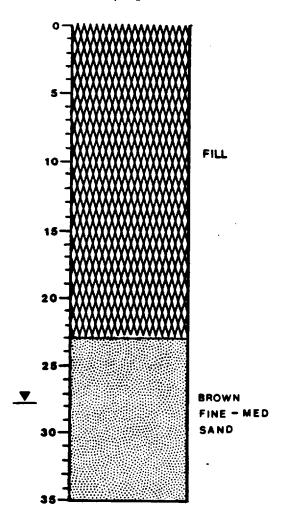
Site Dead Creek Site-P	Boring/Well No. P-5	

ample Depth	Blow Count	Description
		Grass field area on surface.
- 2.5	4-5-7	FILL consisting of loose brown-black silty clay with crushed limestone brick fragments, sand, and small gravel. Dry.
.5 - 5	4-3-4	FILL - same as above with slag and cinder material.
- 7.5	1-2-1	FILL - same as above.
.5 - 10	1-1-2	FILL consisting of brown-red silty clay. Mottled. Some medium grain sand and small gravel.
1 - 12.5	2-2-2	FILL consisting of brown silty CLAY.
3.5 - 15	1-1-2	FILL - same as above.
6 - 17.5	1-1-1	FILL consisting of brown silty CLAY. Trace of fine grain sand. Moist
8.5 - 20	1-1-4	FILL - same as above. Trace of small gravel and asphalt.
1 - 22.5	1-2-3	FILL - same as above. Mottled.
		Fill discontinues @ approx. 23'.
3.5 - 25	2-4-7	Light brown fine to medium SAND. Dry.
6 - 27.5	2-4-6	Light brown fine to medium grain SAND. Trace of silt. Dry.
8.5 - 30	2-4-5	Brown fine grain SAND. Wet.
1 - 32.5	6-7-8	Same as above. Trace of coarse grain sand. Wet.
3.5 - 35	7-11-13	Same as above. Trace of coarse grain sand and small gravel. Wet.
		z.o.s. @ 35'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-12-87
Prepared by _	Tim Maley
Daneh /ft)	Description

Description

P - 5



	· <u>P-5</u>
Location Sit	. <u>P-5</u>
Owner IEPA	
Top of Inner C	asing Elev. MA
Drilling Firm	Pox drilling
Driller Jerr	y Hammon tion Dates 2/12, 2/12/
Start & Compie	Mobile 8-61
Type of kid	MODILE 5-61
Method of Dril	ling 3 3/4" I.D.
hollow stem	augers
•	WELL DATA
Hole Diam. 8	in. 35.0 ft. een Diam.
Boring Depth _	35.0 ft.
Casing and Scr	een Diam
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Screen Type	
Stickup	
well Type	ion:
Mett coustince	10n:
Filter Pack	
G-011	
Lock No.	
_	TEST DATA
	lau Data
Static Water E	lev Date lev. Yes No
Slug Test	Yes No
Test Date	
Hydraulic Cond	uctivity
Other	· · · · · · · · · · · · · · · · · · ·
	TER QUALITY
Samples Taken	Yes No X
w	
No. or sembles	
Types of Samples	••
Types of Samples	Y • 8 No X
Date Sampled	
Date Sampled	
Date Sampled	
Date Sampled _ Samplers _ Samples Analys	ed for
Date Sampled	
Date Sampled	ed for
Date Sampled Samplers Samples Analyz Split Samples Recipient Comments Sub	ed for NoX
Date Sampled Samplers Samples Analyz Split Samples Recipient Comments Sub- from boring	Yes No X  Surface soil samples  10 - 25' analyzed for
Date Sampled Samplers Samples Analyz Split Samples Recipient Comments Sub	Yes No X  Surface soil samples  10 - 25' analyzed for
Date Sampled	Yes No X surface soil samples 10 - 25' analyzed for s.
Date Sampled Samplers Samples Analyz Split Samples Recipient Comments Sub- from boring	Yes No X surface soil samples 10 - 25' analysed for s.
Date Sampled Samplers Samples Analys  Split Samples Recipient Comments Sub- from boring HSL compound	Yes No X  Surface soil samples  10 - 25' analyzed for  8.  REHARKS  ic odor
Date Sampled	Yes No X  Surface soil samples  10 - 25' analyzed for  8.  REHARKS  ic odor

4

Site Dead Creek Site-P	Boring/Well No. P-4

Sample Depth	Blow Count	Description
		Fill material on surface.
1 - 2.5	3-3-5	FILL consisting of dark brown-black silty clay; some crushed limestone, small gravel, and fine to medium grain sand.
3.5 - 5	4-9-8	FILL - same as above with more debris material including paper products and wood chips.
6 - 7.5	3-4-6	FILL - same as above.
8.5 - 10	5-7-22	FILL - same as above.
11 - 12.5	6-7-7	FILL - poor recovery.
13.5 - 15	2-9-5	No recovery.
16 - 17.5	7-14-19	FILL consisting of brown silty CLAY. Some medium-coarse grain sand and small gravel. Trace of a pale yellow solid (hard and brittle) substance. Dry.
18.5 - 20	2-10-2	FILL - same as above. Trace of paper products and wood chips.
21 - 22.5	13-27-17	FILL - same as above with additional debris including asphalt, slag, crushed limestone, wire, and gravel.
23.5 - 25	4-6-8	FILL - same as above.
		Fill discontinues at approx. 26'.
26 - 27.5	3-4-4	Brown fine grain SAND. Trace of silt. Moist.
28.5 - 30	5-10-10	Same as above. Wet.
31 - 32.5	3-6-10	Brown fine to medium grain SAND. Wet.
33.5 - 35	5-10-13	Same as above. Trace of coarse grain sand. Wet.
		E.O.B. @ 35'

roject Name	Dead Creek	Boring/Well NoP-4
roject No. I	L 3140	Location Site P
ate Prepared	2-12-47	Owner IEPA
repared by	im Maley	Top of Inner Casing Elev. MA
		Drilling Firm Fox drilling
enth (ft)	Description	Driller Jerry Hammon
open (re)	Description	Driller Jerry Hammon
		Start & Completion Dates 2/12, 2/12/
		Type of Rig Mobile B-61
	P = 4	
		Method of Drilling 3 3/4" I.D.
0-000	WW M to 10 10 10 10 10 10 10 10 10 10 10 10 10	hollow stem augers
	(**************************************	
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4777	YYYYYYYYYYYY	
<u></u>	/YYYYYYYWWWMI	Hole Diam. 8 in.
799	<b>/////////////////////////////////////</b>	Boring Depth 35.0 ft.
5- <b></b>	MMMMMMMMMMM	Casing and Screen Diam.
		Screen Interval
	AAAAAAAAAAAAAAAAA	Screen Type
TAXXX	#XXXXXXXXXXXXII	Screen Type
-1111	ATTITUTE INTERPRETATION OF THE PROPERTY OF THE	Stickup
<b>I</b> YYYY	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	well Type
7	/YYYYYWWWMI	Well Construction:
10- <b>/</b> ///	<b>/////////////////////////////////////</b>	Filter Pack
- <b>T</b> MM	MMMMMM FILL	Seal
ww		Grout
1444	AAAAAAAAXXXXXXXI <b>XI</b>	Grout
<b>-1</b> 3,3,3,3		Lock No.
-4111	IXXXXXXXYYYYYY	
A MYYY	<u> </u>	TEST DATA
19-77	<b>/</b> ///////////////////////////////////	
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ועעען	( <u>YYYYYYYYYYYYY</u>	Other
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-19999	<b>^</b>	
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74444	AAAAAAAAAAAAA I	WATER QUALITY
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_		No. of Samples
<u>▼</u> 7		No. of Samples Types of Samples
100		
- 1	BROWN	<del></del>
30-	FINE - MED	Date Sampled
		Camplese
	SAND	Samplers
4		Samples Analyzed for
1		
35		Split Samples Yes No_X
		Recipient
		Comments Subsurface soil samples
		from boring 0 - 10' and 25 - 35'
		analyzed for HSL compounds.
		REMARKS
		Slight organic odor.
		Ground elev. 424.65

Site Dead Creek Site-P	Boring/Well No. P-3

	 	-1	C
36201	 <b>ODIN</b>	BIOA	Count

### Description

Sample Debti	h Blow Coun	Description
		Black cinder fill on surface.
1 - 2.5	7-9-12	PILL consisting of black and brown sandy clay with various debris material including paper products, wood chips, cloth, tim, rubber, slag, cinders, crushed limestone, an off-white crystalline substance, hay, and fine to coarse grain sand. Dry.
3.5 - 5	3-3-30/6	FILL - same as above.
6 - 7.5	3-3-6	FILL - same as above.
8.5 - 10	6-18-33	PILL - same as above.
11 - 12.5	12-12-13	FILL - poor recovery. Strong moth ball (naphalene) odor.
13.5 - 15	5-7-15	No recovery.
16 - 17.5	6-17-17	PILL - same as above.
		Fill discontinues @ approx. 16.5'.
		Gray silty very fine grain SAND. Dry.
18.5 - 20	5-7-9	Brown fine grain SAND. Dry.
21 - 22.5	4-6-9	Same as above.
23.5 - 25	3-3-5	Same as above. Moist.
26 - 27.5	4-10-8	Same as above. Wet.
28.5 - 30	5-9-11	Same as above. Wet.
		E.O.B. @ 30'

TABLE R-9: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED BY IEPA ON OCTOBER 12, 1979)

			3.0.0			
PARAMETERS	B- <b>9</b> S	B-9D	B-13D	8-155	B-17S	B-19S
Inorganics						
Arsenic	0.01	0.004	0.002	0.002	0.002	0.007
Cadmium	0.02		0.01			0.01
Chromium	0.03		0.04			0.03
Copper	1.2	0.32	0.87	0.14	0.42	1.6
Iron	290	100	130	56	110	230
Lead	0.2		0.3		0.1	0.2
Magnesium	31	10	27	83	11	28
Manganese	7.8	1	1.4	1.8	0.99	2.8
Nickel	0.6	0.2	1.9	0.1	0.1	0.2
Zinc	3.3	0.36	3	0.4	0.52	0.87
Organics						
Aliphatic hydrocarbons		•		*	*	*
Chlorophenol	*	*				0.81
Chlorotoluene	70	40	10	0.34	11	18
Dichlorbenzene			· · · · · · · · · · · · · · · · · · ·			1.6
Diphenylether					0.32	2.1
Phenol	21	56	10	14.3	41.5	22

NOTE: All results in ppm
Blanks indicate below detection limits
\* Contaminants present, but not quantified

collected by the IEPA from the D'Appolonia monitoring wells in March, 1981. These samples were analyzed specifically for organic compounds. Analytical data for these samples are shown in Table R-10. Concentrations of organic contaminants were detected in all wells sampled. Chlorobenzene (130 to 3000 ppb) was detected in all wells, while biphenylamine, chlorophenol, dichlorobenzene, and dichlorophenol were seen in five or more wells.

In October, 1981, IEPA collected leachate and sediment samples at Site R from an area adjacent to the Mississippi River. Leachate and sediment samples were collected from three locations where leachate seeps were observed flowing from the landfill into the river. Analytical results for these samples are presented in Table R-11, and locations of the samples are shown in Figure R-1. The three water samples showed contamination with a wide variety of organic compounds. PCBs and chloroaniline were detected in all sediment Other compounds detected in sediment samples included samples. 2,4-dichlorophenoxy-acetic acid (2,4-D), chloronitrobenzene, dichloroaniline, chlorophenol, biphenyl-2-ol, and dichlorophenol. presence of 2,4-D and chlorinated phenols in these samples suggested that dioxin was also a potential contaminant at the site. The IEPA subsequently requested assistance from USEPA in securing a laboratory to perform dioxin analysis on leachate samples from Site R. November, 1981 a USEPA contractor (Ecology and Environment, Inc.) collected leachate and sediment samples at three locations adjacent to the river (Figure R-1). A total of eight samples plus three blanks were collected. Dioxin analysis was performed by the Brehm Laboratory at Wright State University. Monsanto obtained split samples and analyzed for chlorinated dibenzo-p-dioxins (CDDs), select organics, and metals. The USEPA samples were analyzed for tetra through octa CDDs and dibenzofurans (CDFs), select organics, and metals. Table R-12 provides an explanation and cross-reference for samples collected by USEPA and Monsanto.

Analytical results for CDDs and CDFs in the USEPA leachate samples

### TABLE R-10: ORGANIC ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED BY IEPA ON MARCH 25, 1981)

### SAMPLE LOCATIONS

<del></del>	· · · · · · · · · · · · · · · · · · ·								<del></del>
PARAMETERS	B-1	B-6S	B-9S	B9D	B11S	B-11D	B-150	B-17D	B-190
Aliphatic hydrocarbons	· · · · · · · · · · · · · · · · · · ·	-			4,000		<del></del>		
Biphenylamine	1,800	250			15,000	1,100	1,300	860	660
Chlorobenzene	3,000	130	720	810	1,000	2,800	2,800	650	300
Ch1oropheno1	6,600	5,300	11,000	12,000	13,000	3,200	3,200		950
Chloronitrobenzene			2,500	1,500					<del></del>
Dichlorobenzene	2,600		-	-	1,000	800	930	420	360
Dichlorophenol	1,100	700			•	630	2,900	670	
Trichlorophenol	-						-	1,200	

NOTE: All results in ug/l (ppb).
Blanks indicate below detection limit.

## TABLE: R-11: ANALYSIS OF LEACHATE AND SEDIMENT SAMPLES FROM SITE R (COLLECTED OCTOBER 2, 1981 BY 1EPA)

	<del></del>		SAMPL	E LOCATIONS		
PARAMETERS	SAMPLE A (WATER) DO22687	SAMPLE B (WATER) DO22688	SAMPLE C (MATER) DO22689	SOIL SAMPLE A DO22690	SOIL SAMPLE B DO22692	SOIL SAMPLE ( D022692
PCB			2.6	48	150	230
Toluene	11	40	150			
Chlorobenzene	160	390	1,600			
Chloroaniline	24,000	22,000	38,000	1,700	190	6,900
Chloronitrobenzene	21,000	9,600	820		130	
2.4-D	16,000	17,000	7,800	53	(<5)	(<5)
2,4,5-T				(<5)	(<5)	(<5)
Dichloronitrobenzene	740	590	790			
Dichloroaniline	870	820	2,800	•		190
Chloronitroaniline	84	33				
Nitroaniline	100	23				
Chiorophenoi .	15,000	30,000	27,000			290
Phenol	22,000 570	17,000	12,000 110			
Methylphenol		220	110			
Dichlarophenal	32,000	7,200	2,100	40		
Nitrophenol	600					
Biphenyldial	1,700					
Aniline	550	120	35			
Methylbenzene	180	2,000	140			
Sucponantde						
4-methyl-2-pentanol	26					
2-methyl cyclopentanol	93					
Biphenyl 2-01	300	300	280			310
Benzenesulfonamide	76	630				
Dichlorobenzene		110	250			
Benzoic Acid/Derivatives Hydroxybenzoic Acid/	12,000	6,600	2,000			
Derivatives	12,000					
2,4-D Isomer	38,000	48,000	29,000			
2.4.5-7 Isomer	10,000	12.000	6,500			

MOTE: All results in ppb.
Blanks indicate below detection limits.
( ) indicates values are unconfirmed.

TABLE R-12: COMPILATION OF LEACHATE AND SEDIMENT SAMPLES COLLECTED AT SITE R IN NOVEMBER, 1981

STATION NUMBER	USEPA SAMPLE NUMBERª	MONSANTO SAMPLE NUMBER	DESCRIPTION
1	<b>S01</b>	MO1	Leachate (5% Sediment)
1	DO1		Duplicate for SO1
1	<b>S02</b>	M02	Sediment
1 1	DO2		Duplicate for SO2
2	S03	MO3	Leachate (10% Sediment)
2	<b>S04</b>	MO4	Sediment
3	<b>S05</b>	MO5	Leachate (10% Sediment
3 3	\$06	M06	Sediment
B1 ank	<b>S07</b>		City of Chicago tap water. Blank for low level analysis.
B1 ank	RO1		City of Chicago tap water. Blank for medium level analysis.
B1 ank	RO1		City of Chicago tap water. Extra blank for low level analysis.

NOTE: Monsanto did not split samples where no number is listed.

a - Samples collected by Ecology and Environment, Inc.

are shown in Table R-13. Tetra- and penta-CDDs and CDFS were not detected in any of the samples. However, higher chlorinated dioxins and furans (hexa through octa isomers) were detected in three of the five samples submitted for analysis. Concentrations of these compounds ranged from 4.5 to 2693 parts per trillion (ppt). The two remaining samples, SO7 and RO1, were water blanks, and showed no detectable CDDs or CDFs. Monsanto also analyzed samples MO1 through MO5 for CDDs, and results showed no detectable concentrations of these compounds.

Inorganic data for the leachate and sediment samples from Site R are shown in Tables R-14 and R-15. In general, the leachate samples did not show significant inorganic contamination, although concentrations of chromium, copper, boron and iron exceeded water quality standards in two or more samples. Cyanide was detected in several samples, but was also found in the blank. Therefore, the results for cyanide should be considered unreliable. Data for the sediment samples show more substantial evidence of contamination. Elevated levels of arsenic, chromium, copper, lead, and barium were found in several Identified organic compounds in leachate and sediment samples are listed in Table R-16. Phenol and chlorinated phenols were found in all but one sediment sample (MO2) at concentrations ranging from 0.2 to 300 ppb. Leachate samples showed elevated levels several organic parameters, including chlorinated phenols, chlorinated benzenes, chloroanilines, and 2.4-D. As shown in Table R-16, there is a significant discrepancy in the Monsanto and USEPA data for the sediment samples. The values listed by Monsanto were consistently and substantially higher than USEPA values. This may be explained by the fact that USEPA's samples were initially analyzed as Because of the higher detection limits medium hazard samples. associated with this analysis, no contaminants were initially found. USEPA subsequently decided to rerun the samples at lower detection limits. It is possible that the increased holding time and handling of these samples were instrumental in the reduction of concentrations of contaminants found.

Site R was assessed using USEPAs Hazard Ranking System (HRS) model in

TABLE R-13: ANALYSIS OF TETRA THROUGH OCTACHLORINATED

DIBENZO-P-DIOXINS AND DIBENZOFURANS
IN LEACHATE SAMPLES FROM SITE R
(COLLECTED NOVEMBER 12, 1981 BY
ECOLOGY AND ENVIRONMENT, INC.)

### **PARAMETERS**

SAMPLE LOCATIONS	TCDDs	TCDFs	PCDDs	PCDFs	HXCDDs	HXCDFs	HPCDDs	HPCDFs	OCDDs	0CDFs
S01 S03 S05 S07 (Blank) R01 (Blank)					4.5 6.3 5.8	6.3 10 6.3	86 181 152	74 182 112	323 675 2693	30 103 53

NOTE: All results in parts per trillion (ppb).

Blanks indicate below detection limits.

Analysis performed by Brehm Laboratory, Wright State University.

TABLE R-14: INORGANIC ANALYSIS OF LEACHATE SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

				MITEL LU	0/11/10/10			
PARAMETERS	S01	M01	DO1	S03	M03	<b>S</b> 05	M05	R01
Arsenic	0.034	0.02	0.031	0.016	0.025	0.029	0.065	
Mercury	0.0002		0.0002	0.0002	0.0014	0.0008	0.001	
Selenium	0.038		0.032	0.026		0.031		
Thallium								
Antimony								
Beryllium		0.008			0.005		0.008	
Cadmium		0.006			0.007		0.008	
Chromium	0.04	0.086	0.02	0.015	0.075	0.02	0.07	0.01
Copper		0.073			0.092		0.08	
Lead	0.005		0.008					
Nickel	0.04	0.155			0.124		0.144	
Silver						0.01		
Zinc	0.048	0.216	0.024	0.01	0.216	0.049	0.062	0.31
Aluminum		26.8			30.5		3.22	
Barium		0.5			0.5		0.36	
Boron	19.7	18	17.1	15.35	13.6	21.6	19.1	
Calcium	N/A	368	N/A	N/A	257	N/A	257	N/A
Cobalt		0.03			0.019		0.031	
Iron	0.06	25.5	0.06		30.8	0.63	27.4	
Magnesium	N/A	43.2	N/A	N/A	48.2	N/A	39.8	N/A
Manganese	0.02	6.27	0.32	1.99	2.1	5.4	8.82	0.03
Molybdenum	N/A	0.53	N/A	N/A	0.403	N/A	0.439	N/A
Phosphorus	N/A	0.9	N/A	N/A	0.907	N/A	2.06	N/A
Sodium	N/A	40.4	N/A	N/A	41.8	N/A	44.2	N/A
Tin						0.02	1.4	
Vanadium		0.18			0.138		0.17	
Cyanide	0.071	N/A	0.057	N/A	N/A _	N/A	N/A	0.13

NOTE: All Results in ppm.

Blanks indicate below detection limits.

N/A - Parameter not analyzed.

RO1 is a water blank.

TABLE R-15: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

<del>+</del>				MPLE LUCAT	10113		
PARAMETERS	<b>S02</b>	S03	MO2	S04	MO4	S06	M06
Arsenic	1.1	2.9	5.3	1.25	9.6	1.8	8.2
Mercury							
Selenium	1.1	1.8		1.5		1.6	
Thallium							
Antimony				4.0			
Beryllium			0.412		0.489		1.08
Cadmium			0.747	0.61	1.04		2.49
Chromium			10.7		10.4		28.7
Copper			7.17		7.89		25.5
Lead	2.4	2.9		2.45		1.7	
Nickel			17.4		18.6		33.8
Zinc	9.5	10	29.5	6.8	36.3	9.2	69.4
Aluminum	150	190	3870	155	4380	170	13,900
Barium			75.4		130	20	7.79
Boron		25	53	17	28.7	26	30.3
Calcium	N/A	N/A	3660	N/A	4010	N/A	<b>6590</b>
Cobalt			4.7		4.8		9.45
Iron	580	660	5870	425	8660	580	12,600
Magnesium	N/A	N/A	1780	N/A	2090	N/A	4080
Manganese	76	46	79.7	42	119	47	273
Molybdenum	N/A	N/A	10.6	N/A	12.5	N/A	22.4
Phosphorus	N/A	N/A	154	N/A	270	N/A	366
Sodium	N/A `	N/A	1840	N/A	1270	N/A	4720
Tin							
Vanadium			14.4		17		43.9
Cyanide	28	13	N/A	6.8	N/A	90	N/A_

NOTE: All results in ppm.

Blanks indicate below detection limit.

N/A - Parameter not analyzed.

# TABLE R-16: IDENTIFIED ORGANIC COMPOUNDS IN LEACHATE AND SEDIMENT SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

SAMPLE LOCATIONS

į		LEACHATE		l			SEDIMENT		•
PARAMETERS	M01	MD3	M05	S02	MO2	<b>S04</b>	MD4	<b>S06</b>	M06
2-Chlorophenol	340	100		0.26		0.2	200	0.4	
2,4-Dichlorophenol	100					0.42		0.56	
Pheno1	130			ł		0.5	300	0.42	300
2,4,6-Trichlorophenol								0.32	
1,4-Dichlorobenzene	30				200		400		600
1,2-Dichlorobenzene	20		· · · · · · · · · · · · · · · · · · ·						
Bis(2 ethylhexyl) Phthalate				1	400		300		400
Chlorobenzene	160	30		l					
Aniline	60	40	25	ı					
Chloroanilines	8000	4000	600	1					
Dichloroanilines	100	40		1					200
Chloronitrobenzenes	3000	80		1					
2,4-D	332	100		l .					
PCBs l			0.008	l .	0.014		0.034		0.19

MOTE: All results in parts per billion (ppb).
Blanks indicate below detection limit.

July, 1982 by Ecology & Environment, Inc. The final migration score assigned to the site was 7.23, which included observed releases for both the ground water and surface water routes. Route scores for ground water and surface water were 6.12 and 10.91 respectively. The air route was assigned a zero score because an observed release had not been documented. The reason for the relatively low final score for Site R is the lack of a target population, which is a major factor in the HRS model. The source of potable water in the area is an intake in the Mississippi River, located approximately 2.5 miles upstream from the site. The upstream location of the intake excludes it from being used in the model.

In 1982, the Illinois Attorney General's office filed suit (Complaint Number 82-CH-185) against Monsanto outlining several apparent violations of the Illinois Environmental Protection Act. For the most part, the Complaint was directed at alleged water pollution caused by the defendant. Relief requested by the Attorney General included civil penalties and issuance of an injunction directing the defendant to immediately prevent seepage of wastes into the Mississippi River, and to remove all such wastes from the property. To date, no information has been located concerning a determination in this case. The Attorney General's office is presently engaged in an ongoing suit against Monsanto in an attempt to have all wastes removed from the site.

USEPA file information suggests that fish studies have been conducted in the Mississippi River in the vicinity of Site R. The Food and Drug Administration (FDA) in Edwardsville, Illinois has found unacceptable concentrations of PCBs in fish collected downstream of Site R. A detailed study was proposed for the area in the immediate vicinity of the site, however, attempts to obtain data from this study have been unsuccessful to date. It is not known if this study was to have included an assessment of the Sauget Treatment Plant effluent, which is discharged immediately northwest of Site R.

In 1982, USEPA developed a comparative analysis of chemicals

detected in monitoring wells and leachate samples from Site R as they relate to wastes reported by Monsanto to have been disposed of at the site. Also included in the analysis were chemicals reported as being manufactured at Monsanto's Krummrich Plant, as documented in the 1977 chemical inventory developed as a result of the Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The analysis revealed a high degree of association or correlation between chemicals detected in the sample, and those reported to have been disposed of or manufactured by Monsanto. A summary of data from this USEPA analysis report is presented in Table R-17.

In 1984, Monsanto contracted Geraghty and Miller, Inc. to perform a detailed hydrogeologic investigation in the Sauget area. Data from this study, which included the installation of approximately 60 monitoring wells, have not been made available.

### Data Assessment and Recommendations

A great deal of data has been developed to date for Site R. Organic contaminants have been detected in both shallow and deep monitoring wells on site, as well as in leachate seeps leaving the site. Evidence of contamination has been observed to a depth of approximately 60 feet in soil borings. A substantial listing of the types and quantities of chemical wastes disposed of at the site was submitted to IEPA by Monsanto. In view of this information the only significant data gaps are: (1) specific delineation of contaminant boundaries, and (2) determination of the presence or absence of air emissions from the site. Because of the permeable nature of the subsurface soils and the characteristics of the wastes present at the site, it is likely that extensive migration of contaminants has occurred.

The present scope of work for the Dead Creek Project includes installation and sampling of monitoring wells at Site R. Ambient air monitoring will also be conducted to determine to what extent, if any, off-gassing of organic contaminants is occurring. Every effort

TABLE R-17: COMPARATIVE ANALYSIS OF CHEMICALS DETECTED IN SAMPLES AT SITE R AND THOSE REPORTED TO HAVE BEEN DISPOSED OR MANUFACTURED BY MONSANTO

	LEACHAT	TE/SEDIMENT A	NALYSIS	GROUNDWATER ANALYSIS	REPORTED DISPOSAL	MANUFACTURED
COMPOUNDS	TEPA	MONSANTO	USEPA	YEPA	OTRAZROM	OTHAZNON
PCBs	X	X				X
Chlorobenzene	X	X		1 X 1	X	X ·
Dichlorobenzene	X	. <b>X</b>		) x		l x
Chloroaniline	X	X			X	į x
Chloronitrobenzene	) X	X		i x i	X	) x
Dichloronitrobenzene	l x					
Chlorophenol	X	Х	X	X	X	X
Dichlorophenol	X	X	X	[ x ]	X	x
2,4-D/Isomers	X	X		1		l x
2,4,5,-T/Isomers	X			1		X
Aniline	X	X				
Dichloroaniline	X				X	
Chloronitroaniline	X				X	X
Mitroaniline	) X			}	X	) X
Pheno 1	j X	X	X	1 x 1	X	
Nitrophenol	) x			1		1
Methylphenol	l x			1 1		
Diphenyldiol	L X			1		<b>,</b>
Benzoic Acid/Derivatives	X				X	X
4-methyl-2-pentanol	1 x			1	X	
2-methylcyclopentanol	X			1	X	
Benzene Sulfonamide	l x			1	X	
Chlorotoluene	) x			1		) x
Dioxins/Dibenzofurans	ł		X	1	X (By Product)	X (By Produc

should be made by th IEPA to obtain data on, and gain access to, the Monsanto wells installed by Geraghty and Miller. Access to these wells would likely eliminate the need for, or at least affect the location of, the monitoring wells to be installed during the field investigation of Site R. Pending the results of ground water sampling, a more specific approach to delineating the extent of contamination could be proposed. Samples should initially be collected from a minimum of 8 wells on Site R, and hydraulic conductivity tests should be run on a minimum of 2 deep and 2 shallow wells. Possibilities for identifying plume characteristics include conducting electromagenetic surveys (including off site areas), and soil gas monitoring. In any event, the lateral and vertical extent of contaminantion must be addressed prior to design of remedial options.

### Site Description

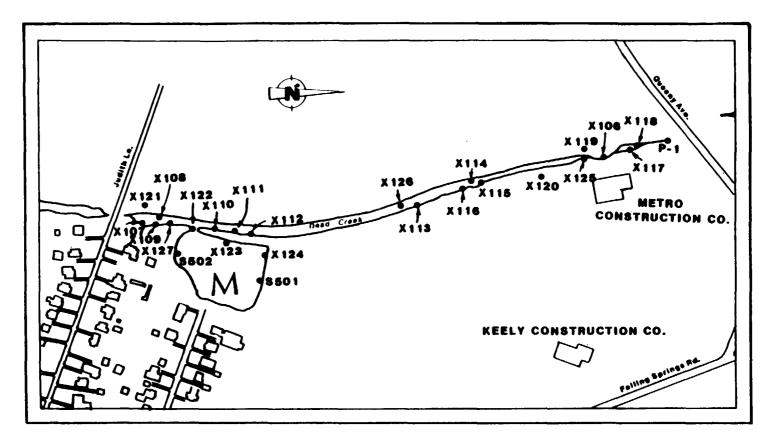
Creek Sector B (CS-B) includes the portion of Dead Creek lying between Queeny Avenue and Judith Lane in Sauget, Illinois. Three other sites in the Dead Creek Project are located adjacent to CS-B. These include Site G to the northwest, Site L to the northeast, and Site M to the southeast. All of these sites have been identified at one time or another as possible sources of pollution in CS-B. Presently, CS-B and Site M are enclosed by a chain link fence which was installed by the USEPA in 1982. The banks of the creek are heavily vegetated, and debris is scattered throughout the northern one-half of CS-B. Culverts at Queeny Avenue and Judith Lane have been blocked in order to prevent any release of contaminants to the remainder of the creek, although the adequacy of these blocks has been questioned several times. Water levels in the creek vary substantially depending on rainfall, and during extended periods of no precipitation, the creek becomes a dry ditch.

### Site History and Previous Investigations

The IEPA initially became aware of environmental problems at CS-B in May, 1980 when several complaints were received concerning smouldering and fires observed the creek bed. In August, 1980, a local resident's dog died, apparently of chemical burns resulting from contact with materials in the ditch. Following this incident, the IEPA conducted preliminary sampling to determine the cause of these problems in CS-B. Chemical analysis of these samples indicated high levels of PCBs, phosphorus, and heavy metals, and the IEPA subsequently authorized the installation of fencing in order to prevent public access to the creek. In September 1980, the Illinois Department of Transportation (IDOT) completed installation of 7000 feet of snow fence with warning signs around CS-B and Site M. IEPA subsequently performed a preliminary hydrogeological investigation in the area in an attempt to identify the sources of pollution in Dead Creek. The results of this investigation are documented in the St. John Report. The snow fence was later replaced with a chain link and barbed wire fence. The installation of this fence was authorized by the USEPA, and was completed in October, 1982.

Prior to the IEPA investigation in 1980, the City of Cahokia Health Department received complaints from area residents concerning discharges from Cerro Copper Product (Cerro) entering CS-B. In 1975. IEPA visited the site in order to determine if these discharges were Investigators observed discoloration in the creek and along the banks similar to what was later observed in the holding ponds at Cerro. One water sample was collected by IEPA from the creek immediately south of Queeny Avenue. Analysis of this sample indicated the presence of copper (0.3 ppm), iron (3.2 ppm), and mercury (0.1 ppb). The culvert under Queeny Avenue was sealed sometime in the early 1970's by Cerro Copper and the Monsanto Chemical Company for the purpose of restricting flow from the holding ponds at Cerro (Creek Sector A). The holding ponds were also regraded to the north to direct their flow to an interceptor discharging to the Sauget Wastewater Treatment Plant. investigators concluded that flow through the blocked culvert had occurred, although the direction of flow could not be determined because no flow was evident at the time of the inspection.

The IEPA hydrogeological study, conducted in 1980, included collecting 20 surface sediment samples for analysis from CS-B (Figure B-1). Analyses of samples from the northern portion of CS-B are presented in Table B-1. Samples x106, x119, x120, x125, and x126 showed PCBs in concentrations ranging from 1.1 to 10,000 parts per million (ppm). Sample x125, taken adjacent to the former Waggoner Company operation, contained additional organic contaminants, including alkylbenzenes (370 ppm), dichlorobenzene (660 ppm), trichlorobenzene (78 ppm), dichlorophenol (170 ppm), and hydrocarbons (21,000 ppm). These contaminants were not detected in other surface sediment samples in the northern portion of CS-B during this



LEGEND

X106 SEDIMENT SAMPLING LOCATION

SSO2 SURFACE WATER SAMPLING LOCATION

P-1 SUBSURFACE SOIL SAMPLING LOCATION



FIGURE 8-1
IEPA SAMPLING LOCATIONS AT CREEK SECTOR 8 AND SITE M

TABLE B-1: ANALYSIS OF SOIL SAMPLES IN THE NORTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

### SAMPLE LOCATIONS

	+				3VALLE	TOCK! TOHS					
PARAMETERS	x106	x113	x114	x115	x116	x117	x118	x119	x120	x125	x126
ATuminum		10,000	6,400	9,000	9,000	1,300	1,200				
Arsenic	1	300	23	18	9	16	15				
Bartum	1	2,400	1,600	3,400	300	400	1,600	510	1,200	2,500	5,000
Berylius	1	-		-	-	-	•	1	1	· •	2
Boron		-	-	-	_	-	6	-	-	-	76
Cadmium		400	-	120	-	-	-	7	3	6	70
Calcium	1	11,000	14,000	11,000	5,000	1,600	6,000	7,300	72,000	6,900	19,000
Chromium	1	250	400	120	130	•	•	36	38	50	100
Cobalt		100	-	40	-	-	-	9	10	9	50
Copper	Į.	3,800	4,800 55,000	22,000	270	160	1,000	100	150	1,000	44,800
Tron		365,000	55,000	40,000	12,000	2,400	4,300	17,500	16,200	7,000	107,000
Lead	1	3,600	2,000	3,200	80	-	100	43	60	260	2,000
Magnes I um	ŀ	4,000	2,800	5,000	2,600	1,200	1,000	4,500	4,300	380	3,700
Manganese	1	120	130	150	60	40	50	260	350	45	280
Mercury	1	30	1.7		0.2	2	2				
Nickel		2,500	1,700	2,400	140	-	-	-	80	130	3,000
Phosphorus	1									2,000	8,900
Potassium		1,400	1,300	1,500	2,300	850	1,200	1,800	1,200	770	860
Silver			•	-	•	50	-	-	•	•	100
Sodium	i	2,800	700	1,100	360	150	180	110	225	80	1,400
Strontlum		150	140	200	40	-	-	47	140	50	300
Van ad 1 um		•	-	150	-	-	•	27	21	13	85
Zinc		61,000	20,000	71,000	2,500	-	300	2,000	700	1,500	62,000
PCBs	5,200							1.1	80	10,000	350
Alkylbenzenes	•							-	-	370	-
Dichlorobenzene	-							-	-	660	-
Dichlorophenol	-							-	-	170	-
Hydrocarbons	-							-	-	21,000	-
Naphthalenes	-							•	-	650	-
Trichlorobenzene	-								-	78	<u>-</u>

MOTE: All results in ppm

Blank indicate parameter not analyzed

- Indicates below detection limits

investigation. In general, inorganic analysis of these samples indicated high levels of several metals in comparison with background conditions (Table B-3, sample x121).

Subsurface soil samples were also collected by IEPA from one location in the northern portion of CS-B during the 1980 investigation. Analyses of samples from boring P-1 are included in Table B-2. Results indicated the presence of PCBs to a depth of seven feet, and other organic contaminants to a depth of three feet. PCB concentrations ranged from 9,200 ppm near the surface to 53 ppm at depths greater than 4 feet and up to 7 feet. Other organic contaminants were detected at concentrations ranging from 12,000 ppm near the surface to 240 ppm at 2.5 feet. These results indicate non-uniform contaminant deposition in the northern portion of CS-B. which is common in riverine systems. The above data indicate that historical release(s) of contaminants to the northern portion of CS-B did occur. However, the horizontal and vertical extent of the resulting contamination has not been fully defined.

Analyses of sediment samples from the southern portion of CS-B are summarized in Table B-3. Sample x121 was taken from soil outside the creek bed to establish background conditions. Samples x107, x122, and x127 contained PCBs at concentrations ranging from 73 to 540 ppm. Sample x122 also showed diclorobenzene (0.35 ppm). This was the only organic contaminant other than PCBs detected in samples from the southern portion of CS-B. Several metals, including arsenic, cadmium, chromium, copper, lead, and zinc, were detected at levels significantly above background concentrations in all However, the metal concentrations were comparable to concentrations detected in samples of sediment taken in the northern portion of CS-B. All of the samples were collected from the creek bed adjacent to, or downstream from Site M, which is an old sand pit excavated by the H.H. Hall Construction Company in approximately 1950. Hazardous materials were not reported to have been disposed of at Site M.

In October, 1980 IEPA and Monsanto Chemical Company cooperatively

TABLE B-2: ANALYSIS OF SUBSURFACE SOIL SAMPLES AT BORING LOCATION P-1 IN CREEK SECTOR B. (COLLECTED BY IEPA 9-8-80)

SAMPLE DEPTH

<del>~~~~~~</del>					<del></del>		
PARAMETERS	0'-1'	1'-2'	2'-3'	3'-4'	4'-5'	5'-6	6'-7'
Biphenyl	6,000	9,000	1,100				
Chloronitrobenzene	200	240	-				
Dichlorobenzene	12,000	8,900	240				
PCBs	9,200	2,600	92B-6	240	53	53	54
Trichlorobenzene	380	3,700	590				
Xylene	540	250					

NOTE: All results in ppm
Blanks indicate below detection limits

TABLE B-3: ANALYSIS OF SOIL SAMPLES IN THE SOUTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

						<del></del>			
PARAMETERS	×107	x108	x109	x110	x111	x112	x121	x122	x127
Aluminum		8,000	9,100	7,000	8,000	6,600			
Arsenic	6,000	44	25	67	80	50			
Barium	4,800	3,800	1,600	4,300	1,800	8,000	230	5,500	2,500
Berylium	•	-	-	-	-	_	-	2	2
Boron	-	-	-	-	-	-	-	-	-
Cadmium	70	-	200	40	100	100	1	35	50
Calcium	11,000	10,000	24,000	16,000	13,000	30,000	11,000	15,000	8,000
Chromium	360	300	-	140	50	50	-	50	340
Cobalt	30	30	20	-	-	30	9	15	30
Copper	32,000	31,000	7,700	22,000	15,000	41,000	100	21,900	28,000
Iron	70,000	58,000	75,000	67,000	68,000	52,000	16,500	50,000	63,000
Lead	24,000	2,000	1,700	2,000	2,000	5,100	-	1,700	1,700
Magnesium	2,900	<b>3,900</b>	3,600	4,100	4,000	4,000	5,900	3,800	2,700
Manganese	150	150	300	200	160	300	370	190	150
Mercury	-	1.7	3	3.3			-	-	-
Nickel	3,500	3,000	900	1,900	2,000	2,700	120	1,700	
Phosphorus	7,040	-	-	-	_	-	_	-	4,700
Potassium	1,200	1,500	1,700	1,300	1,600	1,200	1,500	<b>960</b>	1,000
Silver	40	-	-	-	-	-	-	30	40
Sodium	1,700	900	900	700	1,000	1,600	80	630	700
Strontium	180	200	130	160	160	430	32	190	130
Vanadium	60	-	-	70	100	-	25	45	45
Zinc	25,000	22,000	27,000	25,000	47,000	52,000	230	19,900	28,000
PCBs	120	-	-	-	-	-	-	540	73
Dichlorobenzene	-	-	-	-	-	-	-	0.3	5 -

NOTE: All results in ppm

Blanks indicate that parameter not analyzed

- Indicates parameter is below detector limit

collected three sediment samples from CS-B in order to confirm results of earlier sampling done by IEPA. SD-1 was collected from the creek bed 40 yards-south of Queeny Avenue. This location is adjacent to the former Waggoner Company building and also near an old outfall (effluent pipe) from the Midwest Rubber Company. SD-2 and SD-3 were collected approximately 220 yards south of SD-1, in the central portion of CS-B. Results of these samples, including a blank soil sample collected from the Missouri Bottoms in St. Charles, Mo., are presented in Tables B-4 and B-5. PCBs (45-13,000 ppm) were found in all three samples from CS-B, as were several chlorinated benzenes. Chlorinated phenols and phosphate ester were detected in samples SD-1 and SD-3, but were not found in SD-2. analysis of these samples for inorganic parameters detected generally higher levels of inorganic parameters in SD-2 and SD-3 than those for SD-1 and the soil blank. These results clearly indicate differential contamination in CS-B, with SD-1 showing high levels of PCBs and other organic compounds, whereas SD-2 and SD-3 contained higher levels of metals.

IEPA personnel also collected two sediment samples from CS-B in December, 1982, as part of an area-wide dioxin sampling effort managed by the USEPA which also included Site O. The first sample was collected along the east bank of the creek, approximately 80 yards south of Queeny Avenue. Previous sampling conducted by IEPA in this area had shown high concentrations of PCBs. The second sample was collected along the west bank of the creek, approximately 50 yards south of Queeny Avenue. Both samples were analyzed specifically for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) by a USEPA contract laboratory. The first sample showed a quantified level (0.54 ppb) of TCDD, and the second sample was below the detection limit.

IEPAs Preliminary Hydrogeological Investigation of Dead Creek in 1980 was conducted for the purpose of determining possible sources of pollution observed in CS-B. The study included installation and

TABLE B-4: ORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES-IEPA AND MONSANTO COLLECTED 10-2-80)

	····	SAMP	LE LOCATION	5
PARAMETERS	SD-1	SD-2	SD-3	Blank*
CHLOROBENZENES:				
Monochlorobenzene	(0.9)		(0.3)	
p-Dichlorobenzene	370	(0.3)	(0.4)	
o-Dichlorobenzene	80	(0.6)	ì	
Trichlorobenzenes	85	1.6	$(\bar{0}.7)$	
Tetrachlorobenzenes	6.1	2.4	(0.4)	
Pentacesorobenzene			, ,	
Hexachlorobenzene		1.2		
Nitrochlorobenzenes	120			
CHLOROPHENOLS:				
o-Chlorophenol	3.7			
p-Chlorophenol	6.6		(0.9)	
2.4-Dichlorophenol	1.2		• •	
Pentachlorophenol	130		1.8	
PHOSPHATE ESTERS:				
Dibutylphenyl Phosphate	330		(0.8)	
Butyldiphenyl Phosphate			(0.8)	
Triphenyl Phosphate	2600			
2-Ethylhexyldiphenyl Phosphate			2.2	
Isodecyldiphenyl Phosphate				
T-Butylphenyldiphenyl				
Phosphate	28			
Di-t-butylphenyldiphenyl				
Phosphate				
Nonylphenyl Diphenyl Phosphate				
Cumylphenyldiphenl Phosphate	3.7			
PCBs (C1 <sub>2</sub> to C1 <sub>5</sub> Homologs)	13,000	240	45	

NOTE: All values in ppm

\*Soil blank collected from Missouri Bottoms, St. Charles, Mo.
Blanks indicate below detection limits
( ) Semi-quantitative values

TABLE 8-5: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B
(SPLIT SAMPLES - IEPA AND MONSANTO
COLLECTED 10-2-80)

<del></del>	<del></del>	<u> </u>	SWILL FOOM TOILS				
PARAMETERS	SD-1	SD-2	SD-3	Blank*			
Aluminum	1,400	5,100	5,300	5,600			
Antimony	13	240	160	29			
Arsenic	210	40	55	5			
Barium	770	1,200	1,300	130			
Beryllium	-	•	•	-			
Boron .	28	160	100	27			
Cadmium	5.1	60	55	3.9			
Calcium	8,500	9,200	6,200	4,600			
Chromium	25	110	240	19			
Cobalt	15	180	120	33			
Copper	460	28,000	18,000	19			
Iron	4,700	53,000	30,000	9,900			
Lead	180	2,000	1,600	50			
Magnesium	460	2,200	2,000	2,300			
Manganese	29	170	110	510			
Molybdenum	6.1	92	68	11			
Nickel	110	2,000	1,700	39			
Phosphorus	2,500	13,000	9,400	610			
Silicon	73	150	89	110			
Silver	-	42	29	-			
Sodium	400	540	410	320			
Strontium	35	230	110	17			
Tin	18	260	320	18			
Titanium	32	110	80	37			
Vanadium	34	140	130	130			
Zinc	280	32,000	18,000	56			

NOTE: All values in ppm

\* Soil blank collected from Missouri Bottoms, St. Charles, MO.
- Indicates below detection limits.

sampling of 12 monitoring wells in addition to the 1980 soil/sediment sampling described above. Residential wells were also sampled to determine ground water quality in the area. Locations of IEPA monitoring wells and residential well samples are shown in Figure B-2. All IEPA wells were screened in the Henry Formation sands, with screened interval elevations ranging between 366 and 402 feet Mean Sea Level. The hydraulic gradient in the vicinity of CS-B is very flat, with ground water flow generally to the west toward the Mississippi River.

Analytical data for three sets of samples from the IEPA monitoring wells, corresponding to three sampling events in 1980 and 1981, are presented in Tables 8-6, 8-7, and 8-8. Well Glo8 can be considered a background well due to its location upgradient from the known disposal areas around CS-B. Organic contaminants were consistently found in Wells G107 and G112. These wells are in downgradient monitoring positions for sites G and I respectively. Certain organic contaminants were detected in Wells G102, G109 and G110 during the initial sample event, but these wells did not show any of the organics in subsequent samples. Well G102 is located immediately west of the northern portion of CS-B, and near the southeast corner of Site G. Well G109 is located approximately 150 feet west of the former Waggoner surface impoundment (Site L). Well G110 is located downgradient of Site H. PCBs were detected at one time or another in Wells G101, G102, G104, G106, G107, G110, and G112. Of these, only G101 and G102 showed PCBs in all three sets of samples.

Inorganic analyses of samples from the IEPA monitoring wells indicate several parameters at concentrations above background (G108) and water quality standards. Standards for iron, manganese, and phosphorus were exceeded in samples from the background well. Barium, cadmium and lead were detected at concentrations exceeding standards in one or more well(s). In general, wells G109, G110, and G112 showed the most significant inorganic contamination. When compared with data for other wells, G109 contained very high concentrations of arsenic, copper, nickel, and zinc. The pH for G109

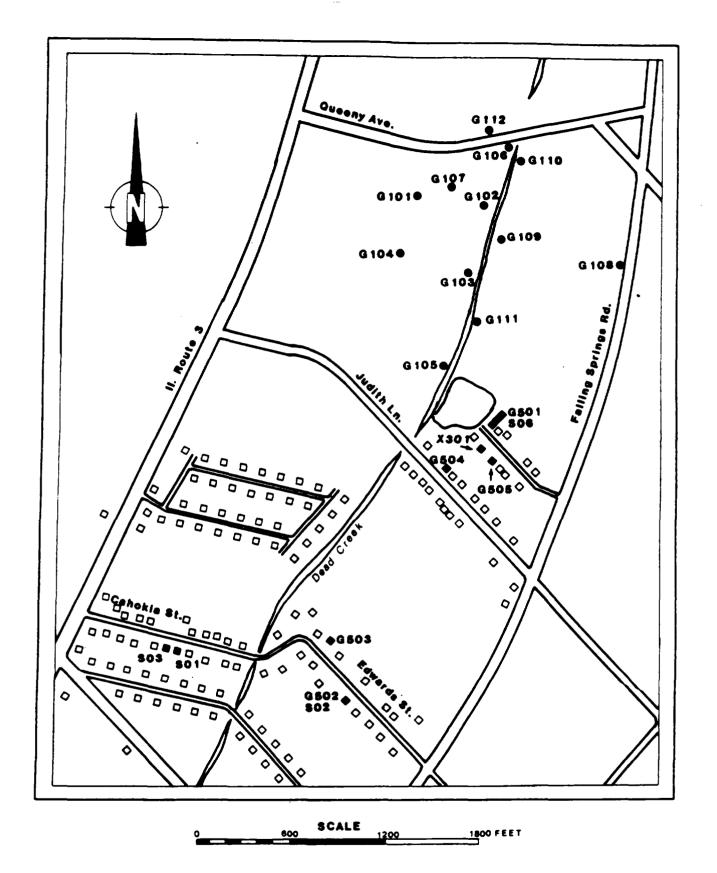


FIGURE 8-2 LOCATIONS OF IEPA MONITORING WELLS AND RESIDENTIAL WELLS SAMPLED IN THE VICINITY OF DEAD CREEK

TABLE B-6: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS (COLLECTED 10-23-80)

	SAMPLE LOCATIONS											
PARAMETERS	6101	6102	6103	6104	6105	6106	6107	6108	6109	G110	6111	G112
Alkalinity	362	410	336	406	271	367	552	375	287	210	302	899
Ammonia	0.3	1.0	1.7	0.4	0.9	2.9	0.5	0.3	4.5	1.2	0.1	1.5
Arsenic	0.023	0.023	0.043	0.049	0.067	0.16	0.043	0.008	0.055	0.053	0.008	0.019
Barium	1.3	0.8	2.9	2.2	2.0	0.6	2.1	0.3	0.2	0.5	0.2	0.5
Boron	0.5	0.4	0.5	0.6	0.4	0.5	0.5	0.4	0.4	0.5	0.5	-5.6
Cadmium	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.06
Calcium	180	210	210	210	340	185	500	140	380	500	110	242
800	237	160	244	206	473	115	1070	298	275	780	79	162
Chloride	48	103	- 58	52	65	109	132	79	69	61	32	363
Chromium (Total)	0.04	0.02	0.09	0.04	0.12	0.01	0.07	0.0	0.0	0.38	0.0	0.01
Chromium (+6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Copper	0.46	0.13	1.1	0.31	0.73	0.44	0.68	0.04	0.13	2.3	0.04	1.2
Cyanide												0.0
Fluoride	0.4	0.7	0.7	0.3	1.0	0.7	0.7	0.3	1.2	0.8	0.3	0.5
Hardness	501	884	549	630	528	637	777	496	1664	279	419	1080
Iron	51.0	30.5	86	90	18	62	13	4.1	39.0	340	5	18
Lead	0.10	0.15	0.26	0.2	0.31	0.0	0.27	0.0	0.0	7.3	0.07	0.44
Magnes i um	0.09	90	79	72	100	49	205	24	100	209	24	82.5
Manganese	5.1	3.8	4.2	3.4	4.2	1.9	9.8	0.98	4.5	8.0	1.1	3.9
Mercury	0.0	0.0	0.0002	0.0	0.0	0.0	0.0	0.000		0.0	0.0	0.0001
Nickel	0.1	0.1	0.9	0.1	0.8	0.1	0.3	0.0	0.5	1.9	0.0	0.3
Nitrate-Nitrite	0.1	0.1	0.1	0.4	0.0	0.1	0.1	1.1	0.0	0.4	0.5	0.0
ρH	6.6	6.6	6.5	6.6	6.6	6.5	6.4	6.6	6.3	6.7	7.0	6.4
Phenolics	0.0	.01	0.0	0.005	0.0	0.06		0.01	0.45	0.015	0.0	0.875
Phosphorus	2.9	1.2	3.3	2.7	6.0	1.8	9.4	.18	.72	16	.24	.69
Potassium	10.6	13.1	13.4	12.3	22	7.7	15.2	13.7	14.9	29	4.9	58
R.O.E.	650	1230	765	790	824	1020	1230	704	2460	508	512	2130
Selenium	0.003	0.001	0.004	0.01	0.008	0.00		0.001	0.001	0.005	0.002	0.001
Silver	0.01	0.0	0.2	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.02	0.11
Sodium	24	60	40	29	57	96		40	40	53	24	260
S.C.	870	1500	1050	1080	1040	1340	1430	960	2470 1348	720	490	518
Sulfate	132	434	230	204	296	281	201	103		93	104	
7	0.6	0.4	6.2	0.3	3.7	0.1	0.8	0.0	0.1	8.0	0.0	7.8
PCB (ppb)	1.0	1.2	-	-	-	•	-	-	10	2.7	-	-
Chlorophenol (ppb)	-	1200	-	-	-	-	630	-	19	-	-	-
Chlorobenzene (ppb)	<u> </u>		<u> </u>	<del>-</del>	<u> </u>		19	<del>-</del>	<u> </u>	-	<u> </u>	100
Dichlorobenzene (ppb)	-	-	-	-	-	-	25	-	-	-	-	65
Dichlorophenol (ppb)	-	-	-	-	-	-	890	•	-		-	-
Cyclohexanone (ppb)	, <del>-</del>	-	-	-	-	•	-	•	120	5.9	-	-
Chloroaniline (ppb)	<del></del>	-	-	-	-	-	-	-	<del>-</del>	-	-	3500

MOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indicates below detection limits.

TABLE 8-7: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS (COLLECTED 1-28-81)

<del>-</del>	SAMPLE LOCATIONS											
PARAMETERS	6101	6102	6103	G104	G105	G106	6107	6108	G109	6110	6111	6112
Alkalinity	447	421	266	520	363	556	621	448	18	308	394	619
Ammon 1 a	0.3	0.0	1.4	0.2	0.7	3.3	1.0	0.0	17	0.2	0.1	0.5
Arsenic	0.015	0.016	0.018	0.002	0.037	0.11	0.021	0.004	7.5	0.013	0.014	0.027
Barium	0.9	1.2	0.9	0.3	1.8	1.0	3.2	0.5	0.2	1.0	0.7	0.5
Boron	0.3	0.4	0.4	0.7	0.4	0.5	0.5	0.2	0.8	0.2	0.6	0.9
Cadmium	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00
Calcium	220.0	328.9	176.3	218.0	319.2	225.5	1169.5	205.5	466.7	169.4	181.4	198.3
C.O.D.	45	93	56	9	143	212	635	8	1315	37	28	47
Chloride	20	128	64	29	59	156	201	76	32	36	18	210
Chromium (Total)	0.02	0.02	0.02	0.00	0.03	0.00	0,09	0.00	0.04	0.02	0.02	0.00
Copper	0.59	0.79	0.36	0.14	0.43	0.29	0.97	0.00	94.1	0.11	0.04	0.28
Cyanide	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Hardness	554	1072	490	717	764	617	960	564	2144	447	530	486
iron	30.4	16.5	20.8	1.4	60.8	67.5	172	0.3	198	19.1	10.1	18.9
Lead	0.17	0.08	0.00	0.00	0.07	0.00	0.32	0.00	0.00	0.00	0.00	0.00
Magnesium	48.2	78.0	46.3	49.1	73.6	49.1	288.1	34.3	184.4	43.5	37.9	54.0
Kanganese	3.02	3.15	3.07	1.41	4.10	2.13	9.64	0.34	8.30	0.77	1.76	2.78
Hercury	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0004	0.0	0.0	0.0
Nickel	0.1	0.1	0.4	0.0	0.2	0.0	0.5	0.0	176	0.9	0.0	0.0
Nitrate-Mitrite	0.0	2.5	0.1	0.5	0.0	0.0	0.2	3.5	0.3	18	0.5	0.0
pH	7.0	7.0	7.1	7.2	7.0	6.9	6.9	7.1	4.1	6.9	7.0	6.9
Phenolics	0.0	0.0	0.0	0.0	0.0	1.46	0.5	0.01	1.86	0.02	0.015	0.05
Phosphorus	0.91	0.88	0.41	0.06	3.6	2.1	10	0.03	3.7	1.0	0.51	0.53
Potassium	6.4	12	8.8	6.0	13	6.2	20	16	18	7.5	4.2	20
Selenium	0.002	0.002	0.002	0.002	0.003	0.002	0.011	0.004	0.006	0.016	0.002	0.0
Silver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sodium	13	63	48	15	50	94	60	30	37	13	14	18
Sulfate	129	583	256	265	468	143	276	86	3371	57	153	212
Zinc	0.3	1.2	1.8	0.1	1.5	0.1	1.5	0.0	10.1	2.0	0.1	2.8
PCB (ppb)	0.22	3.9	-	0.3	•	-	0.4	-	-	-	-	-
(hlorobenzene (ppb)							6.3	-	-			2.5
Dichlorophenol (ppb)							560	-	-			-
Chloroaniline (ppb)							90	-	-			2.1

MOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indicates below detection limits.

TABLE B-8: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS (COLLECTED 3-10-81 - 3-11-81)

					SAMPLE LO	OCATIONS					<del></del>	
PARAMETERS	<u>6101</u>	6102	G103	6104	G105	G106	G107	G108	G109	G1 10	G111	G112
Alkalinity	463	464	319	568	393	594	657	464	58	331	367	400
Ammon1a	0.2	0.0	1.5	0.0	0.4	3.0	0.2	0.0	15	0.0	0.1	0.7
Arsenic	0.001	0.0	0.003	0.001	0.013	0.085	0.004	0.001	3.9	0.001	0.001	0.00
Barium	0.0	0.7	0.1	0.2	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.0
Boron	0.2	0.4	0.3	0.7	0.3	0.5	0.5	0.2	0.5	0.1	0.4	3.4
Cadmium	0.0	0.01	0.01	0.0	0.0	0.0	0.01	0.0	0.07	1.1	0.0	0.17
Calcium	154	333	161	205	218	175	186	148	431	121	164	207
800	10	24	47	9	23	146	47	12	930	10	9	52
Chioride	16	124	46	28	57	150	235	51	24	27	16	133
Chromium (Total)	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.01	0.0	0.0	0.0
Copper	0.04	0.06	0.08	0.02	0.02	0.01	0.01	0.03	67	0.02	0.07	0.48
Cyanide	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hardness	542	1062	620	839	7 <b>96</b>	675	1096	479	1651	424	485	789
Iron	0.3	0.3	1.6	0.0	9.4	4.9	2.4	0.0	1.4	0.0	0.2	0.5
Lead	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.07	0.0
Magnesium	34.2	77.9	41.9	56.8	47	44.8	44.8	22.3	138	28.7	31.8	72
Manganese	2.0	2.98	3.51	0.61	2.32	1.62	2.12	0.23	6.22	0.14	1.02	2.1
Mercury	-	-	-	-	-	-	0.0002	-	0.0003	-	-	-
Nickel	0.0	0.3	1.1	0.0	0.2	0.0	0.0	0.1	123	1.2	0.0	0.4
Nitrate-Nitrite	0.0	1.1	0.0	2.3	0.0	0.0	0.0	0.3	0.3	15	2.7	0.2
pH	6.9	6.8	6.8	6.9	6.8	6.7	6.7	7.0	4.6	6.6	6.8	6.6
Phenolics	0.0	0.0	0.005	0.0	0.0	0.0	1.7	0.1	1.4	0.0	0.0	0.00
Phosphorus	0.0	0.08	0.03	0.02	0.1	1.5	0.03	0.02	2.2	0.01	0.01	0.03
Potassium	4.0	10.8	10.4	5.9	8.9	5.7	2.8	18.2	6.4	6.3	2.9	40.2
Se lenium	0.0	0.0	0.001	0.003	0.0	0.0	0.0	0.001	0.003	0.018	0.001	0.0
Silver	0.01	0.02	0.0	0.0	0.02	0.01	0.01	0.0	0.0	0.01	0.01	0.01
Sodium	11	64	65.6	17.4	51.2	92.6	39.2	25.2	12.1	14.2	15.5	96.6
Sulfate	118	617	471	303	466	146	313	55	2629	61	147	544
Zinc	0.1	0.8	2.8	0.1	0.3	0.1	0.1	0.3	6.3	1.8	0.1	11.8
PCB (ppb)	0.13	0.46	-	0.1	-	2.4	0.37	-	-	0.9	-	2.0

NOTE: All results in ppm unless otherwise noted.

Blanks indicate parameter not analyzed.

- indictes below detection limits.

was 6.3, 4.1, and 4.6 during the three sampling events. This indicates an unidentified source was releasing acid to the groundwater. Other wells which exhibited significant inorganic contamination include G102, G103, G105, and G106, all of which are located adjacent to CS-B along the west side. The data indicates non-uniform ground water contamination in the area, likely resulting from a variety of pollutional sources.

Private wells in the area have been periodically sampled by the IEPA and the USEPA. These wells are no longer used for potable water, but they are used for watering lawns and gardens. Locations of private well samples in the Dead Creek area are shown in Figure 8-2. sampled five residential wells and collected one basement seepage sample near Creek Sectors B and C. Analytical data for these samples are presented in Table B-9. G504, located east of CS-B on Judith Lane, exceeded the standard for copper. The wells all showed water quality similar to that found in IEPA monitoring well G108, indicative of background conditions in the area. The basement seepage sample was collected from a residence on Walnut Street, just east of Site M. Analysis of this sample indicated higher levels of barium and copper, when compared with the private well samples. The seepage sample (x301) also showed a measurable level of chlordane, which was likely due to the application of commercial pesticides.

In March, 1982 the USEPA collected ground water samples from four private wells (SO1, SO2, SO3, and SO6) and two IEPA monitoring wells (SO4 and SO5). Ground water samples SO4 and SO5 correspond to IEPA monitoring wells G102 and G101 respectively. In addition, soil samples (SO7 S10, S11) were collected from three gardens where well water is used for watering. Soil Samples SO7, SO10, and SO11 were collected from gardens at the locations of ground water samples SO1, SO2, and SO3 respectively (see Figure B-2 for approximate sample locations). Water and soil blank samples, RO9 and R12 respectively, were also collected and analyzed. Analytical data for these samples are presented in Tables B-10 and B-11.

TABLE B-9: ANALYSIS OF RESIDENTIAL WELL AND SEEPAGE SAMPLES COLLECTED BY IEPA

SAMPLE DATES AND LOCATIONS

PARAMETERS	9/16/80 6501	9/16/80 G502	9/16/80 G503	9/23/80 G504	6/8/83 G505	1/5/83 ×301
Arsenic	0.008	0.004	0.001	<u> </u>	0.01	0.C17
Barium	0.2	0.16	0.39	0.05	0.4	1.1
Boron	0.28	0.27	0.25	0.58	0.4	0.3
Cadmium Chromium	0.20	0.27	0.25	0.30	0.4	0.3
Copper	0.02			0.06	0.01	0.03
Iron	4.6	19	17.7	0.73	26	31
Lead						0.63
Magnesium	33	39	36	30	35.3	54 🔾
Manganese	1.02	1.26	0.79	0.65	1.3	1.49
Mercury				0.0001		
Nickel				0.02		0.1
Phosphorus				0.02	0.62	1.2
Potassium Silver	6.6	5.7	4.5	6	6.2	6.4
Sodium	21	24	12	. 26	15.2	19
Zinc	0.85	_	0.18	0.8		0.7
PCBs	•	-	•			
Chlordane (ppb)	•	•	-			0.13

NOTE: All results in ppm unless otherwise noted Blanks indicate below detection limit

- Indicates parameter not analyzed

Sample x301 was collected from basement seepage

TABLE B-10: ANALYSIS OF IDENTIFIED ORGANICS IN GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR B (COLLECTED BY USEPA 3-3-82)

SAMPLE LOCATION

				Ground	Water				So	i l	
PARAMETERS	S01	<b>S02</b>	<b>S03</b>	S04	<b>S05</b>	S06	R09	S07	S010	S011	R012
bis(2-ethylhexyl) phthalate	64	. 62			19	a				a	0.44
di-n-butyl phthalate	a	a	a	a	11	a				a	a
diethyl phthalate	a	a	a	a			a	ļ			
3,4 benzofluoranthene	a							ľ			
benzo(k) fluoranthene	a										
butyl benzylphthalate		_		<u>a</u>			a				
methylene chloride	16	16	2300	3100	990	2000	19	1	0.1		0.75
1,2-dichlorobenzene				a				Ì			
1,4-dichlorobenzene				a							
chlorobenzene				a	a			ł			
heptachlor				0.11b	0.146						
beta-BHC				0.18b	0.3b	4.04b				<u> </u>	
g amma - BHC				0.16b	0.25b						
alpha-BHC					0.18b	0.25b					
aldrin				0.17b							
dieldrin								0.012		0.0046	
chlordane									0.11b		
heptachlorepoxide			·			1.46b					
delta-BHC						0.956					
fluoranthene							a			a	
benzo(a) anthracene							a	[		a	
anthracene							a				
pyrene							a	l		a	
Chrysene										a	0.02b

NOTE: All results in ppb

Blanks indicate below detection limit

a - Compound detected at value below specified contract detection limit (compound identified as present, but not quantified)

b- value not confirmed by GCMS

Samples RO9 and RO12 are water and soil blanks, respectively

#### TABLE B-11: INORGANIC ANALYSIS OF GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR B (COLLECTED BY USEPA 3-3-82)

#### SAMPLE LOCATIONS

					<u> </u>		<del></del>			
PARAMETERS	SO1	<b>S02</b>	GROUN 503	ID WATER - 11	n PPB 505	\$06	\$07	SOIL 11	<u>PPM</u> S011	R012
Aluminum	301	400	390	304	940	1,200	750	600	430	MOTE
Antimony		400	350		<del>34</del> 0	1,200	1 /30	000	730	
Arsenic	11			29			1.3	1.0		
	11			69			80	80	80	
Barium							, au	au	80	
Beryllium						110				
Boron	10,500	11,000	8,000	1,800	140	110				
Cadmium	4.2	14	31	5.3		2.8	1.06	1.64	0.29	
Chromium	12						2.2			3.2
Cobalt	62	70	82	95						
Copper	65						16	24	13	
Iron	65,000	31,000	38,000	28,000	530	250	340	360	240	
Lead	570	97	74	9	11	10	(45) 120	(20)	(25) 134	
Manganese	1,600	1,100	1,500	5,100	460	80	120	630	134	
Mercury		-,	•							
Mercury*	0.1	0.4	0.4	0.2	0.1		1			
Nickel	• • • • • • • • • • • • • • • • • • • •			•			6.5	5.5	4	
Selentum							1 0.5	3.3	•	
Silver	}						ı			
Thallium	<del></del>						<del>-  </del>		<del>.</del>	
							1		•	
Tin	l						1		2	
Yanadium			40.000				1			
Zinc	107,000	109.000	40,000	1,900	260	350	96	77	130	

NOTE: Blanks indicate below detection limits

( ) - Results did not meet USEPA Quality Control criteria - Data unreliable

Duplicate analysis performed by USEPA central regional laboratory
Samples RO9 and RO12 are water and soil blanks, respectively

Quantified levels of bis-(2-ethylhexyl) phthalate were found in wells SO1, SO2, and SO5. In addition, seven compounds from the pesticide fraction were detected in Wells SO4, SO5 (IEPA wells), and SO6. Diethyl phthalate, butyl benzylphthalate, and methylene chloride were detected in the water blank, indicating that values of these parameters found in other samples should be disregarded. Methylene chloride was used to decontaminate sampling equipment, and concentrations of this parameter in all samples should not be considered indicative of aquifer conditions. Water quality standards for lead and cadmium were exceeded in one or more wells.

The soil samples showed trace levels of chlordane and dieldrin. It could not be determined if levels of pesticides found in the gardens soils were attributable to the use of well water or application of commercial pesticide products to the gardens. Phthalates, methylene chloride, chrysene, and chromium were detected in the soil blank (RO12), and these compounds should be disregarded in other samples.

In September and October, 1980 IEPA conducted preliminary air monitoring in CS-B. The survey included use of detector tubes (Drager) for halogenated hydrocarbons, and collection of air samples in charcoal tubes with subsequent laboratory analysis. The detector tubes showed positive readings for hydrocarbons in the northern portion of CS-B, adjacent to the former Waggoner Building. were not quantified, and negative readings were observed in all other areas surveyed. Air samples were collected from two locations in CS-B using charcoal tubes and sampling pumps. Two samples were collected from each location in order to monitor conditions for undisturbed and disturbed soil. Samples from the first location, 40 yards south of Queeny Avenue, showed no positive readings for volatile organic compounds (VOCs) for disturbed or undisturbed soil conditions. Xylene was detected for disturbed and undisturbed soil conditions at the second sampling location, which was 60 yards north of Judith Lane, adjacent to Site M. All samples were extracted and analyzed at IEPAs Springfield Laboratory.

A USEPA Field Investigation Team (FIT) contractor also performed an air monitoring survey in the creek bed in March, 1982. This survey involved the use of an organic vapor analyzer (OVA), photoionizer, and Drager detector tubes for phosgene gas. indicated that a small, but measurable, concentration of organic vapors were present in the breathing zone (5 feet above ground surface), with concentrations increasing closer to the creek bed. the breathing zone, the OVA showed readings up to 0.5 ppm above background, and the HNU readings were as high as 9 ppm above background. The survey crew also observed a 3-inch effluent pipeline adjacent to the former Waggoner Building which was discharging a small stream of oily liquid. OVA and HNU readings were taken approximately 6 inches from the surface where this liquid had pooled. The OVA showed concentrations up to 350 ppm, and the HNU showed concentrations ranging from 400 to 900 ppm in this area. gas was not detected in any area using the Drager tubes.

HRS scores have been calculated on two separate occasions for Dead The creek was first scored in July, 1982, by Ecology & Environment, Inc., with a final migration score of 18.48. The site was again scored in March, 1985 by IEPA in an attempt to increase the previous score. IEPAs assessment led to a final score of 29.23, however, this score has not been finalized by USEPA. Route scores for the 1982 assessment were as follows: ground water 4.24, surface water 7.55, and air 30.77. Corresponding route scores in the 1985 assessment were 5.65, 10.07, and 49.23. Observed releases were used for all route scores in both the 1982 and the 1985 scoring packages. The only difference in the assessments was in the value assigned for waste quantity in the three routes. The 1982 package listed waste quantity as unknown (assigned value - 0), while IEPA calculated an approximate volume of waste based on sample results and visual observations.

A significant amount of data has been developed showing a wide range of contaminants in and around CS-B. Review of existing file data indicates numerous possible sources of contamination in the area.

Prior to blocking the culvert at Queeny Avenue, Cerro Copper and Monsanto Chemical reportedly discharged process wastes directly into the creek. According to past IEPA inspection reports the former Waggoner Company, an industrial waste hauling operation, discharged wash waters from truck cleaning activities directly to CS-B. After IEPA order Waggoner to cease this practice, an unlined surface impoundment was apparently used for disposal of wash water. 1940s and 1950s sites H and I were used for disposal of various industrial wastes. These sites were actually a single, large disposal area prior to the construction of Queeny Avenue in the late 1940s. In the 1950s, the Midwest Rubber Company, located west of State Route 50 and south of Queeny Avenue, had an effluent pipeline which ran from their plant location to the northern portion of CS-B. Midwest Rubber Co. reportedly discharged process wastes, including oils and cooling water, to the creek. Site G is a surface/subsurface disposal area with corroded drums and other wastes exposed on the surface. Surface drainage for at least a portion of this site is directed to CS-B.

# Data Assessment and Recommendations

The scope of field investigation work for CS-B during the Dead Creek Project includes collecting three surface water samples from the Creek in Sector B. This sampling program should be sufficient to characterize the water currently in the creek. Soil gas and ambient air monitoring will also be done in and around CS-B.

Although a great deal of data is available for CS-B, most of the data is 4-6 years old. Because of the dynamic nature of the creek and disposal activities in the area, existing conditions may not be accurately characterized by historical sampling data. Feasibility study activities for CS-B could be accomplished using existing data and applying assumptions concerning chemical profiles (contaminant distribution). However, to properly accomplish the feasibility study activities, a current chemical depth profile of the creek bed should be developed. This would consist of collecting

sediment and subsurface soil samples from several locations in the creek bed and along the banks. The hydrology of the area has not been well-defined and should be addressed further. It has not been established whether the ground water discharges to Dead Creek or the creek acts as a recharge conduit for the Henry Formation aquifer. If discharge to the creek is occurring, the subsurface disposal areas (Sites H and I in particular) may be major contributors to the contamination of the creek.

Accordingly, existing IEPA monitoring wells on both sides of the creek should be redeveloped to allow for accurate water level measurements. This, in conjunction with detailed surveying of the creek bed and water levels in the creek, would allow adequate assessment of the hydrology in the area. This would be best accomplished using continuous-recording water level instrumentation, and should be continued over a period of time sufficient to address seasonal fluctuations. In addition, records of industries in the area should be thoroughly reviewed to establish a profile of possible releases from each source.

### SECTORS C THROUGH F - DEAD CREEK

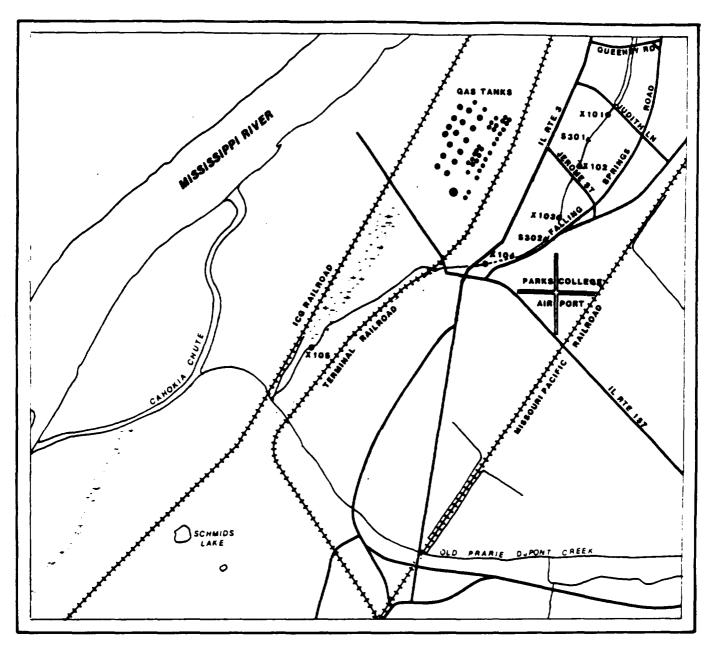
# Site Description

Creek Sectors C through F include the entire length of Dead Creek south of Judith Lane. This portion of the creek flows south-southwest through the Village of Cahokia prior to discharge into the Prairie DuPont floodway. The floodway subsequently discharges into the Cahokia Chute of the Mississippi River. The creek is somewhat wider through these sectors than in sectors A and B, and is not as heavily vegetated as Sector B. Creek Sectors C through F are delineated as follows: CS-C- Judith Lane to Cahokia Street, CS-D - Cahokia Street to Jerome Street, CS-E - Jerome Street to the intersection of State Route 3 and State Route 157, CS-F - intersection (as above) to the discharge point in the old Prairie DuPont Creek.

# Site History and Previous Investigations

There are no known discharges to Dead Creek south of Judith Lane, although several apparent discharge pipes have been observed during preliminary reconnaissance. Site N of the Dead Creek Project is located immediately east of the creek in the southern portion of CS-C. Land use in the vicinity of Sectors C through F is residential/commercial for the most part. The creek flows underground through a culvert in the southern part of CS-E near Parks College. Although the Culvert under Judith Lane has reportedly been blocked, flow emanating from the culvert has been observed on several occasions.

IEPA collected five sediment and two surface water samples from creek Sectors C through F as part of their Preliminary Hydrogeological Study conducted in 1980. Locations of these samples are shown in Figure C-1, and analytical data is presented in Table C-1. The water samples showed very little evidence of contamination, although concentrations of copper exceeded the IEPA's water quality





LEGEND
X101 SEDIMENT SAMPLING LOCATION
S301 SURFACE WATER SAMPLING LOCATION
RESIDENTIAL AREA

FIGURE C-1
IEPA SAMPLING LOCATIONS CREEK SECTORS C THROUGH F

TABLE C-1: ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM CREEK SECTORS C THROUGH F (COLLECTED BY IEPA 9-25-80)

# SAMPLE LOCATIONS

	W	ater		Se	ediment		
PARAMETERS	2301	5302	x101	x102	×103	x104	x105
Aluminum			12,000				
Arsenic	0.008	0.006	26				
Barium	0.12	0.08	1,300	4,700	210	390	475
Berylium	-	-	-	3	-	2	-
Boron	0.06	0.04	-	76	-	-	_
Cadmium	-	- 1	-	50	8	31	2
Calcium			24,000	5,300	210,000	16,000	13,000
Chromium	-	0.01	400	50	60	50	-
Cobalt			40	32	6	8	9
Copper	0.26	0.04	15,000	17,200	320	1,800	360
Iron	0.66	0.87	57,000	110,000	11,000	19,000	18,000
Lead			800	1,300	260	250	75
Magnesium	3	2	7,100	2,000	10,000	5,100	3,300
Manganese	0.03	0.12	600	170	210	160	200
Mercury			1.2				
Nickel	0.05	0.01	2,000	2,300	45	600	-
Phosphorus	0.19	0.2		6,200	720	1,200	4,200
Potassium	6.6	3.3	2,400	900	1,400	2,100	1,400
Silver	-		-	45	10	-	-
Sodium	3	3	800	1,100	100	190	125
Strontium	0.08	0.07	100	140	210	47	43
Vanadium	-	- 1	-	50	22	31	35
Zinc	0.24	-	12,000	21,000	900	5,600	780
PCB	-	-	0.12	0.12	2.8	2	•

NOTE: All results in ppm.

Blanks indicate parameter not analyzed.

- Indicates below detection limits.

standard in both samples. This was the only parameter in either sample which exceeded the standards.

The sediment samples contained relatively high concentrations of cadmium, chromium, copper, lead, nickel, and zinc. Concentrations of these parameters were several times higher than those found in the background soil sample in the IEPA study (sample x121; see Creek Sector B, Table B-3). Arsenic was also detected in sample x101, but was not analyzed for in the other downstream samples. The highest concentrations of aluminum (12,000 ppm) and boron (76 ppm) in the IEPA study were found in downstream sediment samples x101 and x102. respectively. PCB was the only organic compound detected in the downstream sediment samples, with the highest concentration (2.8 ppm) found in x103. Sample x105 was the only downstream sample that did not contain PCBs. These results illustrate the uneven distribution of contaminants within Dead Creek. While some contaminants in Sectors C through F are lower than in CS-B, barium, cadmium, chromium, lead, and nickel were detected in comparable or higher concentrations than sediments in upstream samples. attributable to the mechanical properties of stream flow, such as gradient, channel dimensions, and flow velocity, or to the existence of unknown contaminant sources located in downstream areas.

### Data Assessment and Recommendations

The scope of work for these sectors of the creek during the Dead Creek project includes collecting the following samples: CS-C, 2 surface water, 2 sediment; CS-D, 1 surface water, 2 sediment; CS-E, 3 surface water, 10 sediment; and CS-F, 4 surface water, 10 sediment. The sampling in CS-F will be postponed, pending review of data from the other creek sectors. A soil gas survey and ambient air monitoring will also be conducted in and around Creek Sectors C through E.

For Creek Sectors C through F, waste characterization for the feasibility study activities could be completed with sampling as

proposed provided assumptions regarding chemical profiles are made. However, in order to accurately estimate waste quantities and define to what depth contamination has occurred, a more detailed sampling program is necessary. This would include developing a depth profile of chemical constituents in the creek bed. Cores should be taken from upstream and downstream locations, with additional sampling at point sources as necessary.

# APPENDIX B

# BORING LOGS AND MONITORING WELL DATA

	ead Creek	· · · · · · · · · · · · · · · · · · ·	(IEPA well replaced) Boring/Well No. EE-G101 .
	. 3140		Location Site G
Date Prepared		<u></u>	Owner IEPA
Prepared by Re	Vin Phillips		Top of Inner Casing Elev. 412.35
			Drilling Firm Fox drilling
Depth (ft)	Descr	iption	Driller Jerry Hammon
			Start & Completion Dates 2/25, 2/25/87
	55-0404		Type of Rig <u>Hobile B-61</u>
	EE-G101		Method of Drilling 3 3/4" I.D.
			hollow stem augers
	11		
	4 🛌		WELL DATA
0			
-	# #		Hole Diam. 8 in.
-	##	2424 222441 442 2244	Boring Depth 23 ft.
	# #	DARK BROWN AND GRAY	Casing and Screen Diam. 2 in.
	## ##	CLAYEY SILT	Screen Interval 18 - 23 ft.
5			Screen Type stainless steel 0.01" slot
4 8	## ##		Stickup 2.51 ft. Well Type monitoring
-	##		Well Construction:
-	## ##		Filter Pack 22.5 - 14 ft.
	# # #	BROWN SILT	Seal 14 - 12 ft.
10-	## ##		Grout 12 ft. to surface
4 E	## ##		Lock No. 2834
<b>3</b>			TEST DATA
-	199 OOG		Static Water Elev. 396.86 Date 3-26-87
15-			Static Water Elev. 398.22 Date 5-11-87
		TAN VERY FINE SAND	Slug Test Yes X No No
			Test Date 5-12-87 Hydraulic Conductivity 1.3 x 10 cm/sec
4 14			Other pH = 7.0
<b>-</b>			Cond. = 1600 umhos Temp. = 58° F
20-			Cloudy, yellowish
			WATER QUALITY
23			Acceles Makes Here Ma
			Samples Taken Yes X No No. of Samples 1 round
			Types of Samples groundwater
			Date Sampled 3-17-87
			Samplers E & E
			Samples Analysed for HSL compounds
-			
			Split Samples Yes No_X
			Recipient
			Comments
			REMARKS

IEBA replacement well	Boring/Well Mo.	5-03	atte Deed Creek at
	moijdjiosed	Count	Semple Depth Blow
	enght drill boring.	35	
	stigraphic sequence description taken from IBPs for monitoring well G-101 boring no. B-1 (10-		
netural organics.	7.5' Dark brown and gray clayey SiLT. Trace o	<u>L-0</u>	
	-10' Brown micaceous SILT. Water level @ 9.5'.	<u>ε. τ</u>	
efely sorted to	15' Tan very fine grain SAMD. Arenitic; mode	-01	

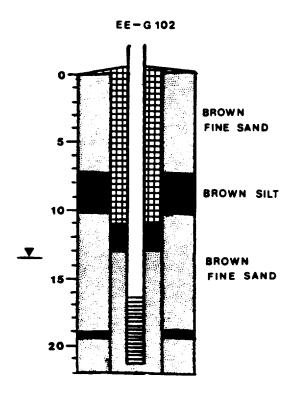
E.O.B. @ 23 ft. (for replacement well sEEG101)

rounded. Contains ferro-magnesian minerals.

15-32. Ten fine to coerse grain SAND. Arkosic, moderately rounded, poorly sorted, contains ferro-magnesian minerals with some medium gravel.

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-26-87
Prepared by	Kevin Phillips

Description



(IEPA well replaced)
(IEPA well replaced)  Boring/Well No. EE-G102
Boring/well NoEE-Gloz
Location Site G
Owner IEPA
Owner TRA
Top of Inner Casing Elev. 409.10
Deilling Firm For deilling
Dilling Firm Fox dilling
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 2/26, 2/26/87
Chart & Completion Robon 3/36 3/36/83
Start & Completion Dates 2/20, 2/20/8/
Type of Rig Mobile B-61
Method of Drilling 3 3/4° I.D.
Method of Drilling 3 3/4" I.D.
hollow stem augers
HOTTON STAT GRAFTS
WELL DATA
******
Holo Diam. & in.
Boring Depth 21.5 Rt.
Casing and Screen Diam. 2 in.
44.8
Screen interval
Screen Type stainless steel 0.01" slot
Hole Diam. 8 in. Boring Depth 21.5 ft. Casing and Screen Diam. 2 in. Screen Interval 16.5 - 21.5 ft. Screen Type stainless steel 0.01° slot Stickup 1.22 ft. Well Type monitoring
Stickup 1.22 ft.
Well Type monitoring
Well Construction:
Filter Pack 22 - 13 ft. Natural
Seel 13 - 11 ft
Pilter Pack   22 - 13 ft. Natural
Grout 11 ft. to surface
Lock No. 2834
•
TEST DATA
•
Static Water Elev. 397.37 Date 3-26-87
Francis Water Play 304 67 Data \$-11-47
SCREEC MREAL RIVE. 390.37 DREA 3-11-07
Slug Test Yes X No
Static Water Blev. 397.37 Date 3-26-87
1000 0000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
MAGISTIC CONGRECTATES TO Y IN CHASAC
MAGISTIC CONGCCTATCA T'A Y IN CENSEC
MAGISTIC CONGCCTATCA T'A Y IN CENSEC
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F
MAGISTIC CONGCCTATCA T'A Y IN CENSEC
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Other PH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish
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Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E E E  Samples Analyzed for HSL compounds  Split Samples Yes No X
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E 5 E  Samples Analyzed for HSL compounds
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E E E  Samples Analyzed for HSL compounds  Split Samples Yes No X
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E E E  Samples Analyzed for HSL compounds  Split Samples Yes No X
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments
Other pH = 6.8  Cond. = 1000 umhos Temp. = 56° F  Clear to yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments

### Site Dead Creek Site-G

### Boring/Well No. Well #EE-G102

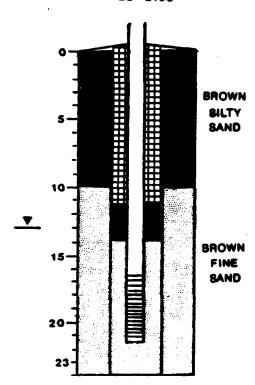
(replacement well for IEPA G-102)

Sample Depth	Blow Count	Description
3.5 - 5	2-3-5	0-5 Loose brown silty fine grain SAND. Trace to little silt. Moist.
	1 1	Loose brown sandy SILT. Some fine grain sand. Very moist.
13.5 - 15	2-3-5	Loose brown fine grain SAND. Well sorted and rounded to sub-rounded. Wet.
18.5 - 20		18.5-19 Gray silty fine grain SAND. Wet.  19'-19'10" - Gray very sandy SILT. Wet.  19'10"-20' - Gray very silty fine grain SAND. Wet.  20-21.5" - Gray fine, coarse grain sand (from IEPA log).
		E.O.B. @ 21.5'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-26-87
Prepared by	Revin Phillips

Description

EE-G103



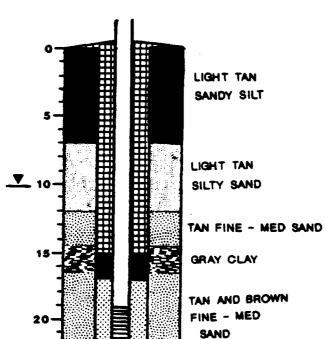
(IEPA well replaced)
Boring/Well No. EE-G103 Location Site G
Owner IEPA
Top of Inner Casing Elev. 408.74
Drilling Pirm Fox drilling
Driller Jerry Hammon Start & Completion Dates 2/26, 2/26/87
Start & Completion Dates 2/26, 2/26/8/
Type of Rig Mobile 8-61
Makhad ad Daillian 3 3 /45 V D
Method of Drilling 3 3/4" I.D. hollow stem augers
uottos acem andeta
WELL DATA
Hole Diam. 8 in. Boring Depth 23.5 ft. Casing and Screen Diam. 2 in.
Boring Depth 23.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18.5 - 21.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.08 ft.
Stickup 1.08 ft. Well Type monitoring Well Construction:
Filter Pack 22 - 14 ft. Natural Seal 14 - 11.5 ft. Grout 11.5 ft. to surface Lock No. 2834
Grand 11 E 44 to curdons
tock Ho 1634
LOCK NO
TEST DATA
Static Water Elev. 397.43 Date 3-26-87
Static Water Elev. $397.43$ Date $3-26-87$ Static Water Elev. $398.57$ Date $5-11-87$
Slug Test Yes No X
Test Date
Hydraulic Conductivity
Other pH = 5.2  Cond. = 1200 umhos Temp. = 56° F  Cloudy, yellowish
Cond. = 1200 umhos Temp. = 56° F
Cloudy, yellowish
WATER QUALITY
Samples Taken Yes X No No. of Samples 1 round
No. of Samples 1 round
Types of Samples groundwater
A.A. A
Date Sampled 3-17-87
Samples Analysed for HSL compounds
Sembras wuerksad tot usr combonuds
Split Samples Yes No X
Recipient
Comments
REMARES

Site Dead Creek S:	lte-G
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## Boring/Well Ho. Well #EE-G103

Sample Dept	h Blow Count	Description
		Straight drill to 8.5'.
		Stratigraphic sequence based on auger cuttings.
8.5 - 10	7-9-10	0-10 Firm brown very silty fine grain SAND. Some silt. Sand is well sorted and rounded to sub-rounded. Moist.
13.5 - 15	5-17-12	Firm brown fine grain SAND. Well sorted. Some black stained stringers throughout. Wet. Slight chemical odor.
18.5 - 20	1-2-3	Loose brown fine grain SAND. Well sorted and rounded. Trace of natural organic layers and wood particles. Wet.
22 - 23.5	5-9-9	Firm brown fine grain SAND. Trace of medium grain sand and small gravel.
		E.O.B. @ 23.5'.

Dead Creek
IL 3140
2-25-87
Kevin Phillips
Description



Location Site G
Owner IEPA
Top of Inner Casing Elev. 408.96
Drilling Firm Fox drilling Driller Jerry Hammon
Driller Jerry Hammon
Start & Completion Dates 2/25, 2/25/87
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 24 ft.
Boring Depth 24 ft.
Casing and Screen Diam. 2 in.
Screen Interval 19 - 24 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.09 ft.
Well three positioning
Well Type monitoring
Well Construction:
Filter Pack 24 - 17 ft.
50al 17 - 15 ft.
Grout 15 ft. to surface
Filter Pack 24 - 17 ft.  Seal 17 - 15 ft.  Grout 15 ft. to surface  Lock No. 2834
TEST DATA
AL-14- Mili- 81 568 A4 Mil 5 65 A8
Static Water Elev. $397.01$ Date $3-26-87$ Static Water Elev. $398.24$ Date $\overline{5-11-87}$
Static Water Elev. 398.24 Date 5-11-87
Slug Test Yes No X
Test Date
Hydraulic Conductivity
Other pH = 6.5
Other pH = 6.5  Cond. = 1000 umhos Temp. = 54° F
WATER QUALITY
Samples Taken Yes X No
Samples Taken Yes X No
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken   Yes   X   No
Samples Taken   Yes X   No
Samples Taken   Yes X   No
Samples Taken   Yes   X   No
Samples Taken   Yes X   No
Samples Taken   Yes X   No
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E & E Samples Analyzed for HSL compounds,
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E & E Samples Analyzed for HSL compounds.  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E & E Samples Analyzed for HSL compounds,
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E & E Samples Analyzed for HSL compounds.  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E E E Samples Analyzed for HSL compounds.  Split Samples Yes No X Recipient  Comments

(IEPA well replaced)

Site Dead Creek Site-G	Boring/Well No. Well 9EE-G104
Sample Depth Blow Count	Description
	Straight drill boring.
	Stratigraphic sequence description taken from IEPA report (April, 198, log for monitoring well G-104 boring no. 8-4 (10-9-80).
	0-7 Light tan sandy SILT. Trace of clay.
	$\frac{7-12}{}$ Light tan silty SAND. Micaceous.
	12-14.5 Tan fine to medium grain SAND. Arkosic.
	14.5-16.5 Gray silty CLAY.
	16.5-37.5 Tan and brown fine to medium grain SAND. Arkosic. Poorly sorted. Subrounded. Trace of small gravel.
	E.O.B. @ 24' (for replacement well # EEG 104)
,	

		(IEPA well replaced)
Project Name <u>Dead Cr</u>	••k	Boring/Well No. EE-G108
Project No. IL 3140		Location Site G
ate Prepared 3-2-87		Owner IEPA
repared by <u>Revin Ph</u>	illips	Top of Inner Casing Blev. 407.21
		Drilling Firm Fox drilling
epth (ft)	Description	Driller Jerry Hammon
		Start & Completion Dates 3/2/87,3/2/8
		Type of Rig Mobile B-61
EE-G	108	
		Method of Drilling 3 3/4" I.D.
<i>i</i> 1		hollow stem augers
		WELL DATA
	##XXXXX	
	##XXXXX	Hole Diam. 8 in.
-IXXXXIII	#######	Boring Depth 30 ft.
- <del> </del>	##*****	Casing and Screen Diam. 2 in.
-WW## F	HWW FILL	Screen Interval 24 - 29 ft.
5-MWHH F	## <b>******</b>	Screen Type stainless steel 0.01" slo
JWWHH F	<del>                                     </del>	Stickup 0.93 ft.
JMMHI E	<del>III</del> MWMI	Well Type monitoring
▼ 7 <b>//////////</b> E	<del>⊞</del> /////I	Well Construction:
<u> </u>	<del>!!!</del>	Filter Pack 29 - 22 ft. Seal 22 - 20 ft.
	<del>Ш</del> (YYYY)	Grout 20 ft. to surface
10- <b>MANA</b>		Lock No. 2834
-		BOCK NO
		TEST DATA
		Static Water Elev. 397.96 Date 3-26-6
]	BROWN AND	Static Water Elev. 398.65 Date 5-11-6
15-	BLACK SILT	Slug Test Yes No X
<b>1888</b> ## F		Test Date
**************************************		Hydraulic Conductivity
		Other pH = 5.4
-	101	Cond. = 1800 umhos Temp. = 56° ?
20-		Clear to cloudy No odor
		WATER QUALITY
		Samples Taken Yes X No
		No. of Samples 1 round
25		Types of Samples groundwater
	DARK CRAK	
	DARK GRAY	Date Sampled 3-18-87
	FINE SAND	Samplers E & E
30		Samples Analyzed for HSL compounds
		Split Samples Yes X No
		Recipient Enviropact
		Comments
		RENARES

ite Dead Creek	Boring/Well Wo. Well #EE-G108
	(replacement well for IEPA G-108)

## Sample Depth Blow Count

#### Description

Straight drill to 23.5'

Stratigraphy sequence based on auger cuttings.

0-10 FILL consisting of brown-black very silty CLAY.

10-23.5 Brown clayey SILT.

23.5-25 Black very sandy SILT. Some fine grain sand. Very moist.

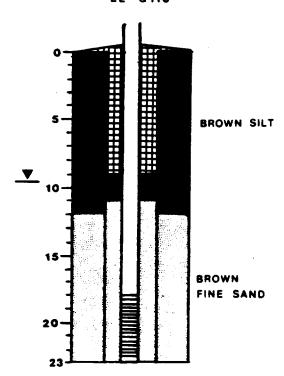
28.5-30 Black to dark gray silty fine SAND. Well sorted. Wet.

E.O.B. @ 30'.

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	12-18-86
Prepared by	Tim Haley

Description

EE-G110



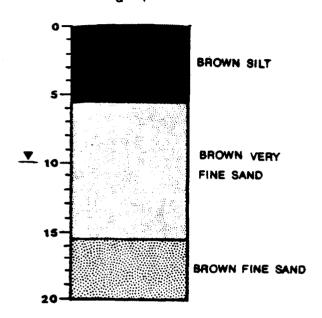
Boring/Well No. EE-G110 Location Site G Owner IEPA Top of Inner Casing Elev. 409.00 Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 12/18,12/18/86
Top of Inner Casing Elev. 409.00 Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates12/18,12/18/86
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates12/18,12/18/86
Driller Jerry Hammon Start & Completion Dates12/18,12/18/86
Driller Jerry Hammon Start & Completion Dates12/18,12/18/86
Start & Completion Dates12/18,12/18/86
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 23.0 ft. Casing and Screen Diam. 2 in.
Boring Depth 23.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft. Screen Type stainless steel 0.01" slot
Screen Type stainless steel 0.01" slot
Stickup 1.82 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 11 ft. Natural Seal 11 - 9 ft.
Seal 11 - 9 ft.
Grout 9 ft. to surface Lock No. 2834
Lock No
TEST DATA
Static Water Play 387 48 Date 3-76-87
Static Water Elev. $397.49$ Date $3-26-87$ Static Water Elev. $398.52$ Date $5-11-87$
Slug Test Yes X No
Test Date 5-13-87
Hvdraulic Conductivity 5.3 x 10 cm/sec
Other DH = 6.8
Other pH = 6.8  Cond. = 1200 umhos Temp. = 58° F
Clear to yellowish
MARCH MILITER
WATER QUALITY
_
Samples Taken Yes X No No No. of Samples 1 round
Samples Taken Yes X No No No. of Samples 1 round
Samples Taken Yes X No No No. of Samples 1 round
Samples Taken Yes_X No
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments

site <u>Dead Cree</u>	k Site-G	Boring/Well No. Well #EE-G110 IEPA replacement wel
Sample Depth B	low Count	Description
Ţ		Straight drill to 13.5'.
		Stratigraphic sequence based on auger cuttings.
		0 to 1' black topsoil.
		1 to 12' brown sandy SILT
		Begin sampling at 13.5'.
3.5 - 15	3-7-6	Brown silty SAND. Wet.
8.5 - 20	3-4-5	Brown to gray fine to medium grain SAND. Wet.
		E.O.B. ● 23'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-12-87
Prepared by	Tim Haley

Description

G - 1



Boring/Well No.	
Location 5ite (	3
Owner IEPA	
rop of Inner Cast	ing Elev. NA
Drilling Firm	Fox drilling Hammon on Dates 1/12, 1/12
Start Complete	nameon
Type of Dig Mai	oile B-61
Method of Drillis	ng <u>3 3/4" I.D.</u>
hollow stem aud	10[8
WEI	LL DATA
Hole Diam. <u>8 i</u> 1	1. ).0 ft.
Boring Depth 20	0.0 ft.
Casing and Screen	Diam.
screen interval	
Screen Type	
Stickup Well Type	<del></del>
Well Construction	1:
Filter Pack	
Seal	
Grout	
Lock No.	
	LST DATA
Static Water Elev	Yes Date No
Static water Elev	yes Date
rest Date	
Hydraulic Conduct	ivity
Other	
WATE	QUALITY
Samples Taken	Yes No. 1
No. of Samples	Yes No
Types of Samples	
Date Sampled	
Samplets	
Samples Analyzed	for
Split Samples	YesNo
Split Samples Recipient	YesNo
Recipient	
Recipient	face soil samples
Comments Subsur	face soil samples
Comments Subsur	face soil samples
Recipient	face soil samples 10' and 10 - 20' L compounds.
Comments Subsur from boring 0 - analyzed for HS	face soil samples 10' and 10 - 20' L compounds.
Recipient	face soil samples 10' and 10 - 20' L compounds.
Comments Subsur from boring 0 - analyzed for HS	face soil samples 10' and 10 - 20' L compounds.
Comments Subsur from boring 0 - analyzed for HS	face soil samples 10' and 10 - 20' L compounds.
Comments Subsur from boring 0 - analyzed for HS	face soil samples 10' and 10 - 20' L compounds.

Sit•	Dead Creek Site-G		Boring/Well Ro.	G-1

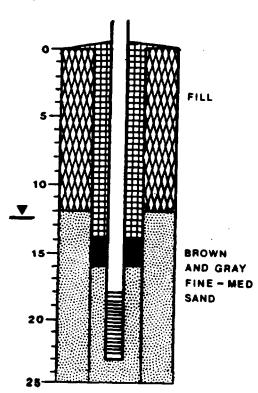
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Sample Depti	Blow Coun	Description	
1 - 2.5	2-1-1	Brown SILT. Trace of fine grain sand (dry).	
3.5 - 5	1-2-2	Same as above.	
5 - 7.5	1-1-1	Brown very fine grain SAND. Trace of silt (wet @ 7').	
0.5 - 10	1-1-1	Same as above. Trace of rust and gray coloring among brown very fingrain sand (wer).	
1 - 12.5	1-2-3	Brown very fine grain SAND. Increasingly siltier (wet).	
13.5 - 15	6-4-8	Same as above.	
16 - 17.5	2-7-6	Brown fine grain SAND (wet).	
18.5 - 20	4-11-12	Same as above.	
		E.O.B. @ 20'	
	[ ]	Water level @ completion approx. 10'.	

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-14-87
Prepared by	Tim Maley

Depth (ft) Description





Boring/Well No. U-2/EE-05	_
Location Site G	_
Owner IEPA	_
Top of Inner Casing Elev. 411.36	_
Drilling Firm Fox drilling	
Driller Jerry Hammon	
Driller <u>Jerry Hammon</u> Start 4 Completion Dates 1/14, 1/14	7
Type of Rig Mobile B-61	_
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	_
Method of Drilling 3 3/4" I.D.	_
method of Dilling 3 3/4 1.D.	_
hollow stem augers	
WELL DATA	
Hole Diam. 8 in. Boring Depth 25 ft.	
Boring Depth 25 ft.	_
Casing and Screen Diam. 2 in.	_
Screen Interval 18 - 23 ft.	
Screen Type stainless steel 0.01" s	1
Stickup 2.3 ft.	
Well Typemonitoring	
Well Construction:	_
Filter Pack 23 - 16 ft.	
Filter Pack 23 - 16 ft. Seal 16 - 14 ft.	_
Grout 14 ft to surface	
Grout 14 ft. to surface Lock No. 2834	-
DOCK NO	
TEST DATA	
Static Water Elev. 396.69 Date 3-26 Static Water Elev. 398.17 Date 5-11	-4
Static Water Elev. 398.17 Date 5-11	<u> </u>
Slug Test Yes No_	X
Test Date	_
Hydraulic Conductivity	
Other <u>pH = 5.2</u>	_
Cond. = 2200 umhos Temp. = 56° F	
WATER QUALITY	
Samples Taken Yes X No_	
Samples Taken Yes X No No. of Samples 1 round	_
Troca of Comples	-
Types of Samples groundwater	
Date Sampled 3-18-87	
Samplers E & E	
Samples Analyzed for HSL compoun	dı
	_
Split Samples Yes X No_	
Recipient Enviropact	_
Composts Subsurface soil secole	
Comments Subsurface soil sample	_
from boring 5 - 15' analyzed for	_
Comments Subsurface soil sample from boring 5 - 15' analyzed for HSL compounds.	_
from boring 5 - 15' analyzed for	_
HSL compounds.	_
from boring 5 - 15' analyzed for HSL compounds.	_
from boring 5 - 15' analyzed for HSL compounds.	_
from boring 5 - 15' analyzed for HSL compounds.	
from boring 5 - 15' analyzed for HSL compounds.	_
from boring 5 - 15' analyzed for HSL compounds.	_
from boring 5 - 15' analyzed for HSL compounds.	
from boring 5 - 15' analyzed for HSL compounds.	

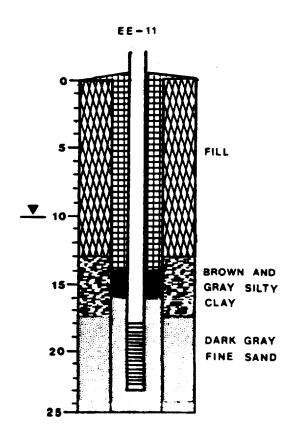
site	Dead Creek Site-G	Boring/Well No. G-2/Well #EE-05

`

Sample Depth	Blow Count	Description
1 - 2.5	3-15-6	FILL consisting of black sandy CLAY with a variety of debris materials including slag, wood, crushed limestone, gravel, and iron fragments (dry).
3.5 - 5	3-5-3	FILL same as above (dry).
6 - 7.5	1-1-1	FILL consisting of brown silty CLAY. Trace of coarse grain sand and paper products (dry).
8.5 - 10	1-0-1	FILL consisting of light gray silty CLAY. Trace of asphalt and a purple paint-like residue substance (dry).
11 - 12.5	1-3-5	FILL (to 12 feet) consisting of dark brown silty CLAY. From 12 feet is gray medium grain sand (moist).
13.5 - 15	3-4-5	Brown-gray medium grain SAND (wet).
16 - 17.5	2-5-10	Brown fine grain SAND. Trace of silt (wet).
18.5 - 20	1-1-5	Same as above. With less silt.
23.5 - 25	7-14-18	Gray fine grain SAND. Trace of silt (wet).
		E.O.B. # 25

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-26-87
Prepared by _	Tim Maley

Description



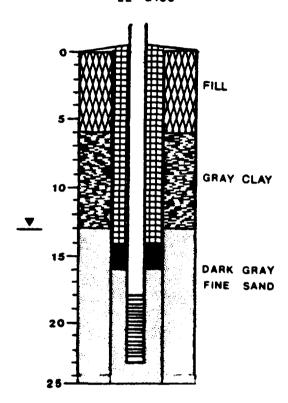
BOLING/ WALL NO
Location Site G
Owner TEPA
Top of Inner Casing Elev. 409.02
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/26-1/26/87
Dellies Ton Grand
Driller Jerry Hammon
Start & Completion Dates 1/26-1/26/87
Type of Rig Mobile B-61
• • • • • • • • • • • • • • • • • • • •
Method of Drilling 3 3/4" I.D.
method of Drilling 3 3/4" 1.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 25 ft.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in. Screen Interval 18 - 23 ft.
2
Screen interval 18 - 23 ft.
enichus 1 87 46
Well Typemonitoring
well lypemonitoring
Well Construction:
Filter Pack 23 - 16 ft.
Grout 14 ft. to surface
Grout 14 IC. to surrace
Lock No. 2834
TEST DATA
Static Water Elev.       397.04       Date       3-26-87         Static Water Elev.       398.26       Date       5-11-87         Slug Test       Yes       No X         Test Date
Static Water Elev. 398.26 Date 5-11-87
Slug Test Yes No X
Test Date
Test Date Hydraulic Conductivity Other pH = 7.2
Hydraulic Conductivity
Other pH = 7.2
Other <u>pH = 7.2</u> Cond. = 7000 unhos Temp. = 56° F
Cond. = 7000 umhos Temp. = 56° F
Other pH = 7.2 Cond. = 7000 umhos Temp. = 56° F Brown to black
Cond. = 7000 umhos Temp. = 56° F Brown to black
Cond. = 7000 umhos Temp. = 56° F
Cond. = 7000 umhos Temp. = 56° F Brown to black WATER QUALITY
Cond. = 7000 unhos Temp. = 56° F Brown to black WATER QUALITY
Cond. = 7000 unhos Temp. = 56° F Brown to black WATER QUALITY
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No  No. of Samples 1 round  Types of Samples groundwater
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No  No. of Samples 1 round  Types of Samples groundwater
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  ***DATER QUALITY**  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F  Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  ***DATER QUALITY**  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.
Cond. = 7000 umhos Temp. = 56° F Brown to black  ***DATER QUALITY**  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.

Sample Depth	Blow Count	Description
1 - 2.5	8-10-11	FILL consisting of brown-black (mottled) silty CLAY. Trace of medium grain sand and wood particles (dry).
3.5 - 5	1-0-6	FILL consisting of dark brown silty CLAY. Trace of fine grain sand and wood particles (moist).
6 - 7.5	6-5-8	FILL consisting of brown-gray-black sandy CLAY. Trace of slag, coarse grain sand, gravel, and wood particles (moist).
8.5 - 10	7-8-11	FILL consisting of black silty CLAY. Trace of slag, coarse sand, and limestone fragments (moist).
11 - 12.5	2-3-3	FILL consisting of brown-gray silty CLAY. Trace of fine grain sand and wood particles (moist).
		FILL discontinues # approx. 13'.
13.5 - 15	1-2-3	Brown-gray silty CLAY. Trace of fine grain sand (moist).
16 - 17.5	1-2-2	Same as above. (tip of spoon showed gray fine grain sand, moist to wet).
18.5 - 20	0-0-1	Dark gray fine grain SAND (wet).
21 - 22.5	0-4-8	Dark gray very fine grain SAND. Increasingly siltier (wet).
23.5 - 25	4-5-6	Dark gray fine grain SAND. Trace of coarse grain sand and small gravel. Some black staining # 25'. (wet).
İ		E.O.B # 25'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-27-87
Prepared by	Tim Maley

Description

EE-G106



	IEPA well replaced)
A 1 A4- 1 1 M -	
BOTING/WOLL NO.	G-4/EE-G106
Location Site	· · · · · · · · · · · · · · · · · · ·
200000000000000000000000000000000000000	
Owner IEPA	<del> </del>
Top of Inner Cas:	ing Elev. 407.97
Drilling Firm	Pox drilling Hammon
Driller Jerry	YARRON
30117	- B-A 1 /36 1 /37 /47
Start & Completion	on Dates 1/26, 1/27/87
Type of Rig Mol	oile B-61
Method of Drillis	2 2 1/4" T D
hollow stem aug	lers
	LL DATA
<b>~~</b>	
Hole Diam. 8 is Boring Depth 2	h
Boring Depth 2	5 2t.
Casing and Screen	Diam 2 in
Castild and Scient	
Screen Interval	18 - 23 It.
Screen Type stain	pless steel 0.01" slot
Stickup 1.44 ff	
Well Type monit	oring
Merr .ibe mour	
Well Construction	1:
Filter Pack	23 - 16 ft. Natural
Seal 16 - 16	i ft.
G2014 14 44	23 - 16 ft. Natural 6 ft. . to surface
9100t 14 PE.	sullace
Lock No. 28:	34
71	EST DATA
••	
Static Water Elev	7. <u>397.40</u> Date <u>3-26-87</u>
Static Water Elev	7. 397.40 Date 3-26-87 7. 398.52 Date 5-11-87
Slug Test	Yes No X
Test Date	
1016 0066	
Hydraulic Conduct	tivity
Other pi	1 = 7.4
Cond = 4200 us	1 = 7.4 shos Temp. = 58° F
Donk oloude (	Maria analysis adam
Dark, Cloudy 3	Strong organic odor
WATE	R QUALITY
	•
Samples Taken	Yes X No
	148 <u>v</u> 40
	. ——
No. of Samples	1 round
No. of Samples	1 round groundwater
No. of Samples Types of Samples	1 round groundwater
No. of Samples	1 round groundwater
No. of Samples	groundwater
No. of Samples Types of Samples  Date Sampled 3-	groundwater
No. of Samples Types of Samples  Date Sampled 3- Samplers E 4 E	groundwater
No. of Samples Types of Samples  Date Sampled 3- Samplers E 4 E	groundwater
No. of Samples Types of Samples  Date Sampled 3- Samplers E & E Samples Analyzed	groundwater  24-87  for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E 4 E	groundwater  24-87  for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E & E Samples Analyzed	groundwater  24-87  for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E E E Samples Analyzed volatile organi	for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E E E Samples Analyzed volatile organi  Split Samples	groundwater  24-87  for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E E E Samples Analyzed volatile organi  Split Samples	for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E E E Samples Analyzed volatile organi	for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient	groundwater  -24-87  forHSL compounds, .cs  Yes NoX
No. of Samples Types of Samples  Date Sampled 3- Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient	groundwater  -24-87  forHSL compounds, .cs  Yes NoX
No. of Samples Types of Samples  Date Sampled 3- Samplers E 4 E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5-	for HSL compounds,
No. of Samples Types of Samples  Date Sampled 3- Samplers E 4 E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5-	groundwater  -24-87  forHSL compounds, .cs  Yes NoX
No. of Samples Types of Samples  Date Sampled 3- Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient	groundwater  -24-87  forHSL compounds, .cs  Yes NoX
No. of Samples Types of Samples  Date Sampled 3- Samplers E 4 E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5-	groundwater  -24-87  forHSL compounds, .cs  Yes NoX
No. of Samples Types of Samples  Date Sampled  Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	groundwater  -24-87  forHSL compounds, .cs  Yes NoX
No. of Samples Types of Samples  Date Sampled  Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers E & E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds.  Yes No X  face soil samples 20' analyzed for
No. of Samples Types of Samples  Date Sampled  Samplers £ £ E Samples Analyzed volatile organi  Split Samples Recipient  Comments Subsur from boring 5  HSL compounds.	for HSL compounds, cs  Yes No X  face soil samples 20' analyzed for

# Site Dead Creek Site-G

Boring/Well No. G-4/well #EE-G106 (IEPA replacement well)

Sample Depth Blow Count		Description	
1 - 2.5	15-7-9	FILL 0-1.5' Black sandy CLAY  1.5-2' Crushed limestone  From 2' Gray silty clay. Trace of fine grain sand (dry).	
3.5 - 5	1-2-2	FILL consisting of brown-black (mottled) silty CLAY. Trace of rust color and fine grain sand (dry). FILL discontinues @ approx. 6'.	
6 - 7.5	1-0-2	Gray silty CLAY. Trace of very fine grain sand (moist).	
8.5 - 10	1-2-2	Same as above with increased moisture and very fine grain sand.	
11 - 12.5	1-2-2	Same as above. Some black staining at 12'.	
13.5 - 15	1-2-5	Dark gray very fine grain SAND. Trace of silt and black staining (wet).	
16 - 17.5	0-1-3	Black fine grain SAND (stained). Light and dark laminated banding of black staining (wet).	
18.5 - 20	1-2-5	Dark gray fine grain SAND (wet).	
21 - 22.5	4-9-8	Black fine grain SAND. Trace of silt (wet).	
23.5 - 25	7-13-21	Gray fine grain SAND (wet).	
		E.O.B. @ 25'	

Project Name Dead Creek Project No. IL 3140		Boring/Well NoG-5
Project No. IL 3140		Location Site G
Date Prepared 1-27-87		Owner IEPA
Prepared by Tim Haley		Top of Inner Casing Elev. MA
		Drilling Firm Fox drilling
Depth (ft) Description		Driller Jerry Hammon
		Start & Completion Dates 1/27, 1/27/87
		Type of Rig Mobile B-61
	G - 5	
		Method of Drilling 3 3/4" I.D.
	WWWWWWWW.	hollow stem augers
مبيلات	XXXXXXXXXXXXI	WELL DATA
7444	WWWWWWW.FILL	Water State
1884	<b>///////////////</b>	Hole Diam. 8 in.
1200	GENTLE CONTROL OF USE	Boring Depth 20.0 ft.
-633		Casing and Screen Diam.
5-803		Screen Interval
-KSK	WASTE	Screen Type
		Stickup
1925		Well Type
XEA		Well Construction:
		Filter Pack
10-		Seal
135	BROWN AND GRAY	Grout
v 198	SILTY CLAY	Lock No.
		TEST DATA
-		TAST DATA
15-		Static Water Elev Date
	DARK BROWN AND BLACK	Static Water Elev Date
-	FINE SAND	Slug Test Yes No
- 68.88	FINE SAND	Slug Test Yes No Test Date
		Hydraulic Conductivity
20		Other
20	<del></del>	
		WATER QUALITY
		Samples Taken Yes No_X
		No of Samples
		No. of Samples Types of Samples
		Date Sampled
		Samplers
		Samples Analyzed for
		Split Samples Yes No X
		Recipient
		Comments Subsurface soil samples
		from boring 5 - 15' analyzed for
		HSL compounds.
		REMARKS Ground elev. 408.02
		Ground Atea. And . As

Site	Dead	Creek	Site-G	
			<del></del>	

Boring/Well Bo. G-5

Sample Depth Blow Count		Description		
1 - 2.5	4-2-2	FILL consisting of brown-black silty CLAY with a variety of debris including wood particles, coarse grain sand, yellow clay-like substance.		
3.5 - 5	1-2-2	WASTE. CLAY and SAND with black tar-like substance. Moist.		
6 - 7.5	21-12-5	No recovery. Black stained wood in tip of spoon. (wet)		
8.5 - 10	4-5-9	WASTE consisting of brown-gray silty CLAY. Trace of wood particles and black staining. (wet)		
i		WASTE discontinues @ approx. 9.0'.		
11 - 12.5	4-7-8	Dark brown-gray silty CLAY. Trace of black staining and thin fine grain seems @ 12'.		
13.5 - 15	2-5-6	Dark brown fine grain SAND. Trace of black staining and silt. (wet)		
16 - 17.5	2-6-7	Black fine grain SAND. (wet)		
18.5 - 20	2-6-9	Same as above. (wet) Thinly laminated with black staining.		
		E.O.B. @ 20'		

	(1881 mal) manipage
Project Name Dead Creek	(IEPA well replaced) Boring/Well NoG-6/EE-G107
Project No. IL 3140	Location Site G
Date Prepared 2-23-87	Owner IEPA
Prepared by Kevin Phillips	Top of Inner Casing Blev. 406.67
	Drilling Firm Fox drilling
Depth (ft) Description	Driller Jerry Hammon
	Start & Completion Dates 2/23, 2/23/87
•	Type of Rig Mobile 8-61
	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
EE-G107	Method of Drilling 3 3/4" I.D.
i .	hollow stem augers, Rotary
<b>f 1</b> ·	
	WELL DATA
1WWHH 1##WW1	Hole Diam. 8 in.
- <del> </del>	Boring Depth 30 ft.
-IWWIEE IIII IIII III III III III III III	Casing and Screen Diam. 2 in.
- <b>!</b> \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Screen Interval 23 - 28 ft.
s-MMH IIIMM FILL	Screen Type stainless steel 0.01" slot
	Stickup 1.12 ft.
	Well Type monitoring
	Well Construction:
	Filter Pack 28 - 23 ft.
	Seal 20 - 18 ft.
→ 10一個銀色井 田野経済	Grout 18 ft. to surface
	Lock No. 2834
	TEST DATA
WASTE	Static Water Elev. 397.15 Date 3-26-87
	Static Water Elev. 398.32 Date 5-11-87
15一次原建出 计联合理	Slug Test Yes No X
	Test Date
	Hydraulic Conductivity
	Other pH = 4.8
	Cond. = 3600 umhos Temp. = 62° F
20-	
	<del></del>
	WATER QUALITY
BROWN AND	
GRAY FINE SAND	Samples Taken Yes X No
	No. of Samples 1 round
25-1   目	Types of Samples groundwater
	Date Sampled 3-18-87
+	Samplers E & E
30	Samples Analyzed for HSL compounds
	<b>6-1/4 61 4 4 4</b>
	Split Samples Yes X No
	Recipient Enviropact
	Comments
	REMARKS

# Boring/Well No. G-6/well #EE-G107

(IEPA Replacement well)

Sample Depth	Blow Count	Description
0 - 2.5	15-3-5	FILL consisting of loose fine to medium grain SAND. Trace of medium gravel, slag, and wood particles. (moist)
3.5 - 5	1-1-2	No recovery. Possible void in fill/debris material.
6 - 7.5	11-14-7	FILL consisting of various debris including wood particles, rubber, sand, and gravel. (moist)
8.5 - 10	2-3-24	WASTE consisting of black flaky material. Shale-like and fissile. (dry)
11 - 12.5	5-1-2	WASTE - same as above. (wet)
13.5 - 15	3-2-1	WASTE consisting of small to medium crushed gravel and cloth products. (wet)
16 - 17.5	1-1-1	WASTE - same as above with paper products. (wet)
18.5 - 20	1-1-1	WASTE consisting of black silty sludge. Some glass fragments and gravel.  (wet)  WASTE discontinues @ approx. 20'.
21 - 22.5	1-2-2	Brown-gray silty fine grain SAND. Well sorted and well rounded. 3 inch varved sandy silt layer in tip of spoon, sample stained throughout (wet).
23.5 - 25	1-3-3	Same as above. Obvious staining throughout sample. Soft gray silty organic clay layer @ 24'-24'3". (wet)
28.5 - 30	8-12-12	29'-29'2" Gray very silty organic CLAY. Trace of fine grain sand. 29'2"-30' Black stained fine to medium grain SAND. Well sorted and well rounded. (wet)
		E.O.B. @ 30'

Bandach Mana B	and Creek		nud-sell He e e
Project NameD Project NoIL	3146		Boring/Well No. <u>G-7</u> Location Site G
Date Prepared	2-24-87	<del></del>	Owner IEPA
Prepared by Ke	win Philling		Top of Inner Casing Elev. NA
trobuted by	van Factorpe	<del></del>	Drilling Firm Fox drilling
Depth (ft)	Descript	tion	Driller Jerry Hammon
Deptil (10)	bosci i p		Start & Completion Dates 2/24, 2/24/87
			Type of Rig <u>Hobile B-61</u>
	_		type of kid Hopite B-si
•	G - 7		Method of Drilling 3 3/4" I.D.
			hollow stem augers
0 <del></del> //////	***********	FILL	
	<b>建筑道</b>		WELL DATA
- 50			Hole Diam. 8 in.
			Boring Depth 27.5 ft.
			Casing and Screen Diam.
			Screen Interval
1973			Stickup
-23			Well Type Well Construction:
-200	<b>美国政治</b>		Well Construction:
<b>—</b> 10 — 20	<b>经工程</b>		Filter Pack
	<b>建</b> 医乙酰		5eal
			Grout
<b>E</b> 2 3		****	Lock No.
		WASTE	TEST DATA
15-	を	•	
- 22		•	Static Water Elev Date
-37205			Static Water Elev. Date Slug Test Yes No
	<b>医工程的工程</b>		
			Hydraulic Conductivity
20-			Other
20			
	Section 1		
			<del></del>
1			WATER QUALITY
25	CONTRACTOR OF COMME		Samples Taken Yes No_X
		100WH 51N5 1450 0445	m
		BROWN FINE - MED SAND	Types of Samples
			Date Sampled
			Samplers
			Samples Analyzed for
			Split Samples Yes No_X_
			Recipient
			Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.
			BEMARKS
			Ground elev. 407.13

Site	Dead	Creek	Site-G
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Boring/Well Bo. G-7

Sample Depth	Blow Count	Description
0 - 2.5	30-50/2	WASTE consisting of reddish-brown and black mottled silty CLAY. Some small gravel. Trace of fine to medium grain sand, brick, wood, concrete, and large gravel. (dry)
3.5 - 5	6-3-4	WASTE - Brick, large gravel, concrete, medium sand. (dry)
6 - 7.5	8-2-2	WASTE $\frac{6'-7'}{7'-7.5'}$ Same as above Trace of wood chips. (moist)
8.5 - 10	4-10-10	WASTE 8.5'-9.5' Black silty-like sludge. Some fine grain sand.  (very moist)  9.5'-10' Brown silty clay. Some fine grain sand. Trace of black staining. (moist)
11 - 12.5	1-1-7	WASTE Black material including oily stained paper and wood products.
13.5 - 15	6-0-1	WASTE - same as above.
16 - 17.5	7-8-8	No recovery - fill including paper products.
18.5 - 20	3-1-1	WASTE consisting of black (stained) fine grain SAND. Trace of paper products and wood. Very loose. (wet)
21 - 22.5	8-7-5	WASTE - same as above.
23.5 - 25	5-4-21	WASTE - consisting of black oily sandy material including paper and wood products. (wet) FILL discontinues @ approx. 25'.
26 - 27.5	8-7-7	Brown fine to medium grain SAND. Well rounded and well sorted. Wood fibers @ 26.5-27'. (wet)
		E.O.B. @ 27.5'

Project Name Dead Creek		Boring/Well No. G-8
Project No. IL 3140 Date Prepared 2-24-87	<del></del>	Location Site G
Date Prepared 2-24-87		Owner IEPA
Prepared by Kevin Phill:	1 ps	Top of Inner Casing Elev. NA
Depth (ft) Dec		Drilling Firm Fox drilling Driller Jerry Hammon
Depen (10)	ectipeton	Start & Completion Dates 2/24, 2/24/87
		Type of Rig <u>Hobile B-61</u>
G - 8		tabe of kid wante 8-91
4-6		Method of Drilling 3 3/4" I.D.
<b>0</b>		hollow stem augera
	MM FILL	
		WELL DATA
- 12 Mars 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13	K A	Hole Diam. 8 in.
		Boring Depth 30.0 ft.
5——		Casing and Screen Diam.
		Screen Interval
<b>大学文学等的</b>	35	Screen Type
		\$tickup
		Well Type
		Well Construction:
▼ 10 - W. C. C. C. C. C. C. C. C. C. C. C. C. C.	66 E	Filter Pack
		5081
一些政治技术	WASTE	Grout
-0.5		Lock No.
		TEST DATA
		Static Water Elev Date
<b>一</b>	i i	Static Water Elev Date
		Slug Test Yes No X
7.600	<b>36</b>	
	1,000 h	Hydraulic Conductivity
20-12-12-12-12-12-12-12-12-12-12-12-12-12-		Other
A CONTRACT CONTRACT	A Section 1	
-	GREENISH BROWN	WATER QUALITY
25-	SANDY SILT	
	Risea	Samples Taken Yes No_X
		No. of Samples
	GREENISH BROWN	Types of Samples
	FINE - MED SAND	
	3.44	Date Sepaled
30		Date Sampled
		Samplers Samples Analyzed for
		Split Samples Yes No_X_
		Recipient
		Comments Subsurface soil samples
		from boring 10 - 20' analyzed for
		HSL compounds.
		REMARKS
		Ground elev. 406.57

Site	Dead	Creek	Site-G
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Boring/Well Ho. G-8

Sample Depth Blow Count		Description		
0 - 2.5	5-10-15	FILL 0-1.5 Brown silty CLAY. Some fine grain sand, brick, and glass fragments.  WASTE 1.5-2.5 Black (oily stained) silty CLAY. Some paper products and glass fragments. (moist)		
3.5 - 5	5-9-3	WASTE consisting of gray silty CLAY. Some crushed gravel and wood. Black stained sandy layers $\theta$ 3.5-4'. (moist)		
6 - 7.5	2-3-2	WASTE consisting of black (stained) silty CLAY and small gravel. (moist)		
8.5 - 10	2-1-0	WASTE consisting of black (stained) oily CLAY. Some small gravel and and medium grain sand. (very moist)		
11 - 12.5	1-3-5	WASTE consisting of black (heavily stained) oily material. Mottled with with white chalky material. (wet)		
13.5 - 15	3-50/3	WASTE consisting of black oily sludge-like material including wood.		
16 - 17.5	7-12-9	WASTE - Black stained compacted cardboard, paper, and wood. (wet)		
18.5 - 20	3-14-31	WASTE - Black sludge and compacted waste, metal and wood (wet).		
21 - 22.5	4-3-0	WASTE - same as above. WASTE discontinues @ approx. 23'.		
23.5 - 25	2-2-2	Greenish-brown sandy SILT. Some black staining. (wet)		
26 - 27.5	3-5-7	Greenish-brown fine grain SAND. Some black staining. Oily sheen. (wet)		
28.5 - 30	1-4-9	Brown fine to medium grain SAND. Some black staining. (wet)		

Project Name D	ead .Creek		Boring/Well No. G-9
Project No. IL			Location Site G
Date Prepared	2-24-87		Owner IEPA
Prepared by Ke	vin Phillips	<del></del>	Top of Inner Casing Elev. NA
		<del></del>	Drilling Firm Fox drilling
Depth (ft)	Descripti	on	Driller Jerry Hammon
2000 (10)		. • • •	Start & Completion Dates 2/24, 2/24/87
			Type of Rig Mobile B-61
	G - 9		Type of kid Hopite p-of
	9-8		Method of Drilling 3 3/4" I.D.
0-84444			hollow stem augers
-1XXXXX	KXXXXXXXXXXXX		WELL DATA
-100000			MEED CHIN
TXXXX			'ole Diam. 8 in.
_100000			oring Depth 37.5 ft.
_ 7,000			asing and Screen Diam.
5- <b>M</b>		FILL	asing and Setten Diem.
-1,000		· · <del></del>	creen Interval
<del>-1</del>	<b>*************************************</b>		creen Type
- <b>!</b>	<b>************************</b>		tickup ell Type
MMML	<b>/////////////////////////////////////</b>		ell Construction: ·
	<b>*************************************</b>		Wilter Back
A 10 Tallocal	37. C. S. S. S. S. S. S. S. S. S. S. S. S. S.		Filter Pack
13.11	2000年1000年100日		Seal Grout
1962			Lock No.
- 100			
			TEST DATA
15-23-3			
-422	97.5		tatic Water Elev Date
			tatic Water Elev. Date tatic Water Elev. Date lug Test Yes No
-22363			lug Test Yes No
			est Date
20-			ydraulic Conductivity
(3)	<b>建筑建筑</b>		ther
17.5	W EXPLICATE W	ASTE	
7.07.55			WATER QUALITY
	<b>建长金属的</b>		40000
25-13-2			amples Taken Yes No_X
			o, of Samples
- 100			ypes of Samples
- 30.0			
- 5336			
30-			ate Sampled
			amplers
			amples Analyzed for
	<b>发表的数据</b>		
-5.4	200 May 5 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3		9/2 00-09
35一四次(6)			plit Samples Yes No X
-13/25/20	GR	EENISH BROWN AND BLACK	ecipient
- <u>-</u>		FINE SAND	omments Subsurface soil samples
		THE SAID	from boring 35 - 40' analysed for
			HSL compounds.
		•	nsb composites.
		•	
			REMARKS Ground elev. 407.70
			Ground elev. 407.70
			<del></del>
		•	
		•	
		•	

Site	Dead	Creek	Site-G

Boring/Well No. \_\_G-9

Sample Depth Blo	w Count	Description
0 - 2.5 3	-5-5	FILL consisting of black and reddish brown silty CLAY. Trace of smell gravel. (moist)
3.5 - 5	-6-6	PILL (uncompacted) consisting of brown silty CLAY with some medium grain sand and small to medium gravel.
6 - 7.5	-1-1	1" recovery of uncompacted fill.
8.5 - 10 6	-2-2	Little recovery - still in uncompacted fill material including wood chips.
11 - 12.5		WASTE consisting of black fiberous material with pink greese-like globules. (wet) Pink globules float on water.
13.5 - 15	-2-2	WASTE consisting of black sludge-like material including wood chips. (moist)
16 - 17.5	-5-6	WASTE 16'-17 1/4' Black oily sludge material including small spherical beads. (approx BB. size) (wet) 17 1/4'-17 1/2' Gray sandy silt. Some black staining. (wet)
18.5 - 20 5	-7-9	WASTE consisting of black (oily stained) sandy sludge. Some fiberous cloth products. (wet)
21 - 22.5 5	-2-2	WASTE consisting of black (oily stained) sandy sludge including cardboard, wood, small spherical beads, paper products, and a thick peanut butter like substance @ 27'. (wet)
23.5 - 25 3-	7-24	WASTE - Black paper, cardboard, and wood. (wet)
26 - 27.5 4	-7-9	WASTE - Black sludge and wood fibers. Black fine sand in tip.
28.5 - 30 10	-50/4	WASTE - same as above with metal banding.
31 - 32.5 7-	10-14	WASTE - Black stained wood particles.
33.5 - 35 3		WASTE - Black sludge. WASTE discontinues @ approx. 36'.
36 - 37.5 8-	ŀ	Greenish brown-black (stained) oily fine grain SAND. Well sorted and well rounded. (wet)
		E.O.B. @ 37.5'.

	<del>_</del>	,		
Project Name	Dead Creek		Boring/Well No. H-1	
Project Name _ Project No	IL 3140		Location Site H	
Date Prepared	12-18-86	<del></del>	Owner IEPA	
Prepared by	Tim Maley		Top of Inner Casing Elev. NA	
		<del></del>	Drilling Firm Fox drilling	
Depth (ft)	Descrip	tion	Driller Jerry Hammon	
Deptil (11)	H - 1		Start & Completion Dates 12-18-86	
	••		Type of Rig Mobile 8-61	
<b>a</b>			Type of Kid Montie 8-61	
אר <sup>ט</sup>			Method of Drilling 3 3/4" I.D. hollow	
<b>1</b> W	***************************************			
-1444			stem augers and rotary	
- <del>I</del> W	<b>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</b>		****	
-100	***************************************	•	WELL DATA	
<_ <b>₩</b>	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Hole Diam. 8 in.	
, W	^^^^		Boring Depth 50.0 ft.	
789	<b>*************************************</b>	FILL	Boring Depth 50.0 It.	
<b>1</b> 00	***************************************	* ICC	Casing and Screen Diam.	
<b>▼</b> - <del>1</del> ₩	***************************************		Screen Interval	
	^^^^		screen type	
10- <b>I</b> XX	***********		serekup	
	^^^^		well lybe	
MYY	<i>*************************************</i>		Well Construction:	
TM	<i>?</i> ??????????????		Filter Pack	
737	STREET STREET		Seal	
-			diode	
15-5	<b>经验证金额</b>		Lock No.	
3			TEST DATA	
7,02				
			Static Water Elev. Date	
		WASTE	Static Water Elev Date No	
20-	1776 Ary 10 18 18	WASTE .		
-532	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Test Date	
			Hydraulic Conductivity	
			Other	
16°	2017年1月19日		<del></del>	
	· 医克尔氏 医克尔氏学		<del></del>	
25-13			NAMES AND THE	
V0004	ADDITION AND LABOUR DAY		MATER QUALITY	
			Assults Ashar Was Ma M	
			Samples Taken Yes No X	
			No. of Samples Types of Samples	
30-			Types or Samples	
307			<del></del>	
7			Baka Bamalad	
-		BLACK MED - CRS	Date Sampled	
			Samplers Samples Analyzed for	
		SAND	Samples Whathked for	
35-			<del></del>	
7.33			Colin Comples - Voc - Mo V	
			Split Samples Yes No X	
-			Recipient	
-1:33			Comments Subsurface soil samples	
40-≓∷			from boring 15 - 25' and 35 - 50'	
			enelyzed for HSL compounds.	
			energied for ast compounds.	
7	with the second			
1			REMARKS	
4			Strong organic odor	
45-			actoud ordente ogot	
4		BLACK FINE SAND	Ground elev. 407.29	
1	era a 🗼 🚶 i 🖠		GLOUNG STAY: 407.23	
4.				
3				
7	State of the state			
50 <i>-</i>				

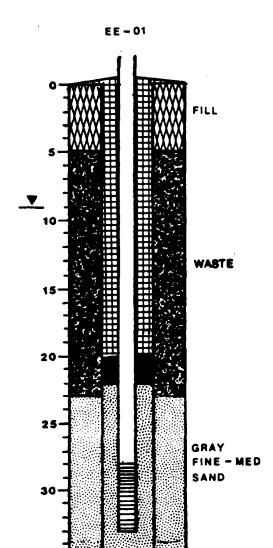
Site Dead C	reek Site-H	Boring/Well No. H-1
Sample Dept	h Blow Count	Description
1 - 2.5	3-3-8	FILL consisting of black sandy CLAY with some brick and crushed limestone fragments (dry).
3.5 - 5	1-3-2	FILL consisting of brown-black silty CLAY. Trace of small to large gravel and medium grain sand (dry).
6 - 7.5	16-5-4	FILL same as above. Some black asphalt-like substance at 6'.
8.5 - 10	12-7-6	FILL consisting of brown fine to medium grain send and small gravel.  Some crushed limestone fragments. (wet).
11 - 12.5	4-4-5	FILL same as above. (wet)
13.5 ~ 15	2-2-1	WASTE - Broken glass and wood.
16 - 17.5	5-8-22	WASTE - same as above (wet).
18.5 ~ 20	8-10-15	WASTE - consisting of black (oily stained) sludge-like material including various debris such as concrete, rubber, paper products, wood chips, and small gravel. (wet).
21 - 22.5	4-8-6	WASTE - same as above.
23.5 ~ 25	4-10-8	WASTE - same as above.
		WASTE discontinues @ approx. 26'.
26 - 27.5	1-1-1	Black (stained) medium to coarse grain SAND. Trace of small gravel. (wet)
28.5 ~ 30	10-14-16	Same as above.
31 - 32.5	6-8-10	Same as above with increased amount of small to large gravel.
33.5 ~ 35	15-17-21	Same as above with less black staining and less gravel.
36 - 37.5	10-13-16	Same black (stained) medium to coarse grain SAND. Decreasing amount of gravel. (wet)
38.5 - 40	8-11-10	Black (stained) medium grain SAND. (wet)

Site Dead Creek Site-H		Boring/Well Bo. H-1 (con'
Sample Depth	Blow Count	Description
41 - 42.5	11-19-21	Same as above to 42'. From 42' black (stained) fine grain SAND. (wet)
43.5 - 45	11-11-14	Same as above.
46 - 47.5	10-14-14	Same as above.
48.5 - 50	10-15-18	Same as above.
		E.O.B. @ 50'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-6-87
Prepared by Kevin Phillips

Depth (ft)

Description



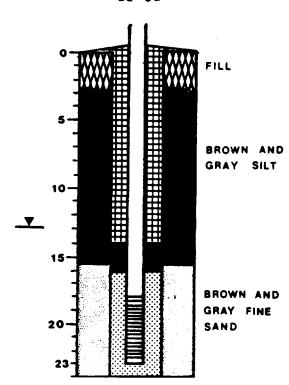
Boring/Well No. H-2/EE-01
Location Site H
Top of Inner Casing Blev. 408.84
Top of Inner Casing Elev. 406.84
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/5/87,1/6/87
Driller Jerry Hammon
Start & Completion Dates 1/5/87 1/6/87
30210 E COMPTOCION DECOS 1/3/07/07
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
heller stee succes Betser
hollow stem augers, Rotary
WELL DATA
Hole Diam. 8 in. Boring Depth 35.0 ft. Casing and Screen Diam. 2 in.
Borine Sooth 38 A de
Botting Depth 33.0 IC.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
201-1-1-1
Stickup 2.3 ft. Well Type monitoring
Well Type monitoring
Well Construction:
Filter Back 11 - 27 ft
Filter Pack 33 - 22 ft.  Seal 22 - 20 ft.  Grout 10 ft. to surface  Lock No. 2834
30al <u>22 - 20 ft.</u>
Grout 10 ft. to surface
Lock No. 2834
TEST DATA
Static Water Elev. 397.41 Date 3-26-87
94-44- Wakes Wien 366 66 Dake 6 11 67
Static water Elev. 398.55 Date 3-11-67
Static Water Elev. $397.41$ Date $3-26-87$ Static Water Elev. $398.55$ Date $5-11-87$ Slug Test Pate Yes No X
Test Date
Hydraulic Conductivity
mydraulic conductivity
Other ph = 6.8
Cond. = 2600 umhos Temp. = 56° ?
Other ph = 6.8  Cond. = 2600 umhos Temp. = 56° F  Yellow-brown color, turbid
WATER QUALITY
MATER CONTILLI
Samples Taken Yes X No
No of Samples 1 round
No. of Semples 1 today
No. of Samples
Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds
Samples Analyzed for HSL compounds  Split Samples Yes No X
Split Samples Yes No X
Samples Analyzed for HSL compounds
Split Samples Yes No X Recipient
Split Samples Yes No X Recipient  Comments Subsurface soil sample
Split Samples Yes No X  Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for
Split Samples Yes No X  Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for
Split Samples Yes No X Recipient  Comments Subsurface soil sample
Split Samples Yes No X  Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for
Split Samples Yes No X  Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X  Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X  Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.
Split Samples Yes No X Recipient  Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.

Sample Depth B	low Count	Description
1 - 2.5	3-3-4	0-1.5 FILL consisting of black cinders and small gravel. (dry)  1.5-2.5 FILL consisting of brownish cinders, slag, and medium grain sand. (dry)
3.5 - 5	2-3-3	3.5-4 FILL - same as above.  4-5 FILL consisting of dark gray SILT. Soft and stained. Little of fine grain sand. (very moist)
5 - 7.5	35-17-19	WASTE steel and a coal-like dense black flaky substance.
1.5 - 10	2-3-3	WASTE - Wood and paper products, heavy black staining.
11 - 12.5	3-3-5	WASTE - same as above.
3.5 - 15	2-3-5	WASTE consisting of black (stained) silt, medium grain sand and wood.
.6 - 17.5	4-8-9	WASTE - Wood chips.
8.5 - 20	5-7-14	WASTE - same as above.
21 - 22.5	9-10-13	WASTE - same as above.
		WASTE discontinues @ approx. 23'.
23.5 - 25	2-1-6	Firm brownish-gray fine-medium grain SAND. Black staining throughout. Well-rounded and well sorted. Rounded to subangular. (wet)
33.5 - 35	9-10-12	Dense gray fine-medium grain SAND. Trace of coarse grain sand. Fairly well sorted and rounded to subangular. (wet)
		E.O.B. @ 35

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-6-87
Prepared by	Kevin Phillips
• -	

Description





Boring/Well No.	H-3/EE-02
Location Site	<u> </u>
Top of Trees Co-	ing Elev. 409.91
Drilling Fire	Por drilling
riller Jerry	Fox drilling Hammon on Dates 1/6/87,1/6/87
tart & Completion	on Dates 1/6/87.1/6/87
pe of Rig Moi	bile B-61
thod of Drilli	ng 3 3/4" I.D.
hollow stem au-	gers
WE	LL DATA
ole Diam. 8 in	n .
ring Depth	3.0 ft. n Diam. 2 in. 18 - 23 ft.
sing and Screet	h Diam. Zin.
reen Interval	10 - 23 ft.
ickup 2 28 de	nless steel 0.01" slot
1) Type Boni	t. toring
11 Construction	n:
Filter Pack	23 - 16 ft.
Seal . 16 - 1	ft.
Grout 14 ft	. to surface
Lock No. 28	ft. . to surface 34
	EST DATA
tatic Water Ele	v. 397.58 Date 3-26-87
tatic Water Ele	v. 398.61 Date 5-11-87
ug Test	Yes No X
st Date	v. 397.58 Date 3-26-87 v. 398.61 Date 5-11-87 No X
draulic Conduct	tivity
ther $pH = 4$	.0 mhos Temp. = 54 P
Cond. = 4200 u	mhos Temp. = 54 P
Yellowish	
	R QUALITY
amples Taken	Yes X No 1 round groundwater
of Samples	1 round
pes of Samples	groundwater
ate Sampled 3	-17-87
amplers E & E	for HSL compounds
	nes compounds
plit Samples	Yes No_X
cipient	
Aments Subsul	rface soil samples
rom poring 10	- 20' analyzed for
HSL compounds.	
Slight organic	REMARKS odor
attane ordente	
<del></del>	

## Site Dead Creek Site-H

Boring/Well No. H-3/well #EE-02

Sample Depth Blow Count		Description	
1 - 2.5	6-10-13	0-2.5 FILL consisting of dense brown sandy CLAY including small gravel, cinders, and brick fragments.	
3.5 - 5	2-3-4	Firm brown SILT and silty CLAY. Trace of fine grain sand. (moist).	
6 - 7.5	2-4-6	Firm brown to yellowish brown very sandy SILT. Some fine grain sand and trace of silty clay. (moist)	
8.5 - 10	2-2-2	Same as above. (very moist)	
11 - 12.5	5-11-14	Dense brownish-gray silt and fine grain SAND. (wet)	
13.5 - 15	7-7-7	Same as above.	
		Water table @ approx. 13 feet.	
16 - 17.5	9-10-20	Very dense gray very silty fine grain SAND. Some silt. Wet.	
18.5 - 20	9-10-11	(From 18 to 23 feet) tan dense very fine grain SAND. Very well sorted. Wet.	
		E.O.B. @ 23 feet.	

Project Name	Dead Creek		Boring/Well No. H-4
Project No.	TL 3140	<del></del>	Location Site H
7.0,000 NO.	1L 3140 1-8-87	<del></del>	Location Site a
Date Stabated	1-0-07	<del></del>	Owner IEPA
htebated ph _	Kevin Phillips		Top of Inner Casing Elev. NA
			Drilling Firm Fox drilling
Depth (ft)	Descrip	ption	Driller Jerry Hammon
	H - 4		Start & Completion Dates 1/7 & 1/8/87
			Type of Rig Mobile B-61
0711		•	
- <b>I</b> W	**********		Method of Drilling 3 3/4" I.D. hollow
IW.	<b>~~~~~~~~</b>		stem augers and rotary
789	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
1444	<b>^</b>		WELL DATA
<b>-1</b> 99	*********	FILL	
s– <del>/</del> ₩	~~~~~~~~~		Hole Diam. 8 in.
-IM	////////		Boring Depth 50.0 ft.
JW.	<b>YYYYYYYYYY</b>		Casing and Screen Diam.
	12-05/17/17/17/17		Carring and Serven Stan.
-137	<b>加加斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯</b>		Screen Interval
-85	SECTION SHOWS		Screen Type
_ 10_4	March Control		Stickup
V	机合机造设置的		Well Type
	3.540(美元公司)(A)		Well Type Well Construction:
- 139	Tex Self english sons		Filter Pack
- 312			Seal
			Grout tock Me
782			Lock No.
15-13	<b>"这个人是一个人的,我们就是一个人的,我们就是一个人的,我们就是一个人的,我们就是一个人的,我们就是一个人的,我们就是一个人的,我们就是一个人的,我们就是一个人的,我们</b>		
-133		WASTE	TEST DATA
- 131			Static Water Elev Date
- 1	37 ST ST ST ST ST ST ST ST ST ST ST ST ST		Static Water Elev. Date No No
20_28			Slug Test Yes No
			Test Date
7834			Hydraulic Conductivity
- 100			Other
-			<del></del>
- 155			
			<del></del>
25-21			
-	and the second		WATER QUALITY
-4			Samples Taken Yes No_X_
4			No. of Samples Types of Samples
30-			Types of Samples
- I			
<u>.</u>	1		Date Sampled
7			
			Samples Analysed for
4			
35-		BROWN AND OR AV	
4		BROWN AND GRAY	
4			Split Samples Yes No_X
4	agredicini in the destruction of	FINE SAND	Recipient
4			Comments Subsurface soil samples
40-			from boring 10 - 25' analyzed for
L			
7			HSL compounds.
1			
4			
4			REMARS
45			Ground elev. 408.28
7			
4			
4			
1	1		
<u>_59_<del></del></u>			

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<b>E1+</b>	Dead	Crack	Site-H

Boring/Well No. H-4

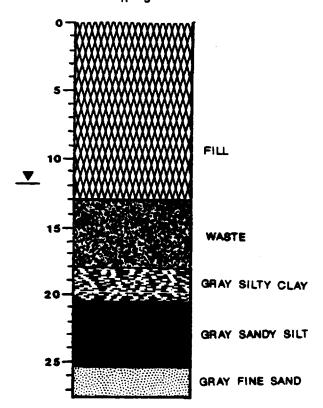
Sample Depth	Slow Count	Description
1 - 2.5	6-9-12	FILL consisting of black silty CLAY and cinders, brick fragments, and medium grain sand. Dry.
3.5 - 5	2-3-10	FILL consisting of black very sandy CLAY. Some slag and black staining. Moist.
6 - 7.5	6-13-15	6-7' FILL same as above,  7-7.5' WASTE Very heavy black oil or tar like staining (approximately 3 inches thick)
8.5 - 10	4-5-2	8.5-9 FILL consisting of brown silty CLAY.  9-10 WASTE Black (heavily stained) sludge-like material with a trace of flecks. Very moist.
11 - 12.5	2-3-2	WASTE black sludge. Wet.
13.5 - 15	3-2-2	WASTE same as above, including hard small spherical beads ( $1/8^{\circ}$ dia.), and paper products. Wet with a visible oily sheen.
16 - 17.5	2-2-2	WASTE same as above, including granular material and broken glass fragments. (Some of the glass fragments appeared to have a threaded top such as a sample jar). Wet.
18.5 - 20	3-4-5	WASTE same as above, including a greenish-yellow jelly like material. Wet with an oil or tar like substance adhering to the spoon.
21 - 22.5	9-16-11	WASTE same as above, including a white granular material veined with brownish-red, glass fragments, and burnt wood. Wet.
23.5 - 25	2-2-15	WASTE consisting of multi-colored (red, green, brown, black, and white) materials; including a chunk of a waxy white substance that breaks into flakes.
		WASTE discontinues @ approx. 26'.
26 - 27.5	10-15-17	Firm brownish-gray fine grain SAND. Some silt. Wet. Very clayey $\theta$ $26'-26.5'$ .
28.5 - 30	1-1-1	Very loose brown fine grain SAND. Trace of medium to coarse grain sand. Very well sorted. Wet.

Site Dead Cre	ook Sito-H	Boring/Well No. H-4 cont.
Sample Depth	Slow Count	Description
31 - 32.5	3-5-7	Firm brown fine grain SAND. Trace of medium grain sand. Well sorted and well rounded. Some gray staining # 31'-31.5'.
33.5 - 35	6-7-13	Firm gray very silty fine grain SAND. Some black banding # 34 to 35'. Wet.
36 - 37.5	8-12-18	Dense gray fine grain SAND. Well rounded and well sorted. Wet.
30.5 - 40	9-14-20	Dense gray fine grain SAND; little silt. Well sorted and well rounded. Wet. 2-inch poorly sorted fine to coarse grain SAND. Seam @ 39.5'. Trace of small gravel.
41 - 42.5	9-12-16	Dense gray fine to coarse grain SAND. Well rounded. Wet.
43.5 - 45	8-9-10	Firm gray fine grain SAND. Wet.
46 - 47.5	9-12-14	Same as above.
48.5 - 50	14-17-25	Same as above.
		E.O.B. @ 50'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	
Prepared by _	Kevin Phillips
<del></del>	

Description

H - 5



Boring/Well No. H-5 Location Site H
Owner IZPA
man of Tonor Chains Blass Ma
Drilling Firm <u>fox drilling</u>
Driller Jerry Hammon
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/7 & 1/7/87
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 27.5 ft.
Boring Depth 27.5 ft.
Screen Interval
screen lype
setekab
well type
Well Construction:
Filter Pack
5001
Grout
Lock No.
TEST DATA
Static Water Elev. Date Static Water Elev. Date Slug Test Yes No Test Date Hydraulic Conductivity
Static Water Elev Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other
WATER QUALITY
· ·
· ·
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samplers No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

Sit.	Dead Creek Site-H	Boring/Well Ho.	H-5
		<u></u> -	

Sample Depth Blow Count		Description	
1 - 2.5	5-9-14	FILL consisting of brown silty CLAY including cinders, medium grain sand, and brick fragments. Dry.	
3.5 - 5	3-4-6	FILL consisting of firm gray clayey SILT. Trace of small gravel and fine grain sand. Moist.	
6 - 7.5	1-3-3	FILL same as above. Mottled with black silt. Moist.	
8.5 - 10	7-8-10	FILL black cinders and small to medium gravel.  Dry.	
11 - 12.5	1-5-4	FILL same as above. (water @ approx. 12')	
13.5 - 15	9-17-20	WASTE consisting of various debris materials, rubber, paper, and cloth products.	
16 - 17.5	6-4-1	No recovery - probably same as above. Fill discontinues @ approx. 18'.	
18.5 - 20	1-2-1	Soft gray very silty CLAY. Little fine grain sand. Moist.	
21 - 22.5	2-1-4	Loose gray very sandy SILT. Some fine grain sand. Wet.	
23.5 - 25	3-2-3	Same as above.	
26 - 27.5	1-1-2	Loose gray fine grain SAND. Trace of silt. Well sorted. Wet.	
		E.O.B. @ 27.5'	

Project Name Dead Cr	••k	Boring/Well No. H-6
Project No. IL 3140	·····	Location Site H
Date Prepared 1-7-87		
Prepared by Kevin Ph	illing	Owner IEPA
		Top of Inner Casing Elev. NA
Book (Ab)		Drilling Firm Fox drilling
Depth (ft) H-6	Description	Driller Jerry Hammon
•		Start & Completion Dates 1/7 & 1/7/87
_		Type of Rig Mobile B-61
<b>○</b> ₩₩₩₩₩	<b>∕</b>	<del></del>
<del>-}</del> \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	<b>WWW</b>	Method of Drilling 3 3/4" I.D. hollow
	*********	stem augers and rotary
***************************************	VAAAAAANI	
1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	WWW FILL	WELL DATA
-#*********		MADE CATA
s-MAAAAAAAA	XXXXXXI	Majo Miso A to
	KAXAXA M	Hole Diam. 8 in.
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Boring Depth 50.0 ft.
	Control of the contro	Casing and Screen Diam.
- ESC 5 3 5 3		Screen Interval
	3 3 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	screen Type
	<b>砂液类</b>	Stickup
10-20		Well Type
	<b>公共政</b>	Well Construction:
		Filter Pack
	46.7 ( ) E	Seel
		Seal
		Grout
15-63-30-30	WASTE	Lock No.
- 100		
		TEST DATA
TO THE STATE OF		Static Water Elev Date
	<b>明斯德</b> 拉	Static Water Elev. Date
20-25-36-68-6		Slug Test Yes No
		Test Date
	570 E	Hydraulic Conductivity
		Other
	5.00	
-ESPECIAL ESPE		<del></del>
25-1		
		M
		WATER QUALITY
4 4 4 4	GRAY SILTY CLAY	
		Samples Taken Yes No_X
		No. of Samples
		Types of Samples
30-		
		Date Sampled
_860666666666	000000000 000000000	Samplers
		Samples Analyzed for
<b>36-</b> [0000000000		
-848488888888		
		Split Samples Yes No X
	CONTROL COM SIME CAME	Recipient
	GRAY FINE SAND	
40-1888888888		Comments Subsurface soil samples
		from boring 35 - 50' analyzed for
		HSL compounds.
	0000000	
	\$\$\$\$\$\$\$\$ <b>!</b>	
	0000000	remarks
45-1000000000000000000000000000000000000		Ground elev. 408.19
	\$3550550 <b>.</b>	
<b>-</b> ₹00000000000000		
4333333333333	\$\$\$\$\$\$\$\$ <b>\$</b>	<del></del>
Produktion		
7() <del></del>		

Site Dead	Creek	Site-H
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Boring/Well No. H-6

Sample Depth	Blow Count	Description
1 - 2.5	6-14-5	PILL 0-1.5 Black cinders, coarse grain sand and small gravel.  1.5-2.5 Brown silty CLAY. Some small gravel, black cinders, and brick fragments.
3.5 - 5	5-7-10	FILL consisting of dark brown coarse grain SAND and small gravel. Dry.
6 - 7.5	5-9-5	WASTE consisting of black-brown clayey SAND. Some small to large gravel. Also includes a black flaky substance. Moist.
8.5 10	11-16-12	WASTE $8.5-9.5$ Black oil or tar-like stained sludge including a black flaky substance as above.
		9.5-10 Brown and black coarse grain SAND and small gravel. Some black flaky material as above.
11 - 12.5	4-3-2	WASTE 11-11.5 Yellowish-brown chunky waste. Very moist.  11.5-12.5 Coarse grain SAND and small gravel. Stained black with viscous liquid. Very moist.
		Water <b>€</b> 13'.
13.5 - 15	5-4-3	WASTE consisting of sand and gravel with various debris materials including paper and cloth products and black stained wood chips.
16 - 17.5	3-2-2	WASTE same as above.
18.5 - 20	2-1-3	WASTE consisting of brown-black stained sludge including small hard spherical beads (~1/8" dia.) and wood chips. Wet.
21 - 22.5	1-1-4	WASTE consisting of dark gray sludge with a soft and sticky red substance throughout; (turns hexane green).
23.5 - 25	3-3-5	WASTE same as above; with small spherical beads and more red substance. Fill discontinues @ approx. 26'.
26 - 27.5	1-1-1	Soft gray very milty CLAY. Black stains and streaks. Wet.
28.5 - 30	2-4-7	Firm gray fine grain SAND. Well rounded and sorted. Top 6 inches stained dark gray. Wet.

Site Dead Creek Site-H		Boring/Well No. H-6 cont.
Sample Dept	h Blow Count	Description
foot samp	1•	
interval fr	o <b>m</b>	
30′.		
13.5 - 35	9-12-18	Same as above.
8.5 - 40	12-20-24	Gray very dense fine to coarse grain SAND. Wet.
3.5 - 45	15-22-28	Light gray very dense fine grain SAND. Trace of silt. Well sorted. Wet.
18.5 - 50	10-10-17	Same as above.
		z.o.s. @ 50'.

	<del> </del>		
Project Name	Dead Creek		Boring/Well No. H-7
		<del></del>	Location Site H
Date Prepared		<del></del>	Owner IEPA
	Kevin Phillips	<del></del>	Top of Inner Casing Elev. NA
_		<del></del>	Drilling Firm Fox drilling
Depth (ft)	Descrip	ption	Driller Jerry Hammon
	H <b>–</b> 7		Start & Completion Dates 1/8 & 1/8/87
			Type of Rig Mobile B-61
0711	11111111111111111	Ī	
<b>-1XX</b>	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		Method of Drilling 3 3/4" I.D.
- <b>K</b> XX		FILL	hollow stem augers, Rotary
111			
123		·	WELL DATA
s - 51			Hole Diam. 8 in.
			Boring Depth 50.0 ft.
	474253		Casing and Screen Diam.
	- CA 6		Screen Interval
		GRAY SILTY CLAY	Screen Type
		GRAF SIEFF OCAL	Stickup
10-13-			Well Type Well Construction:
T.			
			Filter Pack
			Seal
- 17			Grout
15₹≨			2007 110.
- 💥			TEST DATA
			Static Water Elev Date
-			Static Water Elev Date
20-			
			Test Date
			Hydraulic Conductivity
			Other
			<u></u>
25-			
		•	WATER QUALITY
			Samples Taken Yes No X
			No. of Samples
- 7 T		BROWN AND GRAY	Types of Samples
30-			
7		FINE - MED SAND	Date Sampled
7			Samplers
-			Samples Analysed for
-			
35-			
-			
-			Split Samples Yes No X
-			Recipient
40-			Comments No subsurface soil samples
			analyzed.
_			<del></del>
l			
			remarks
45-			Ground elev. 410.66
78%			
7			
7			
7			
<b>= ^</b>			

Site Dead Creek S:	H-ef
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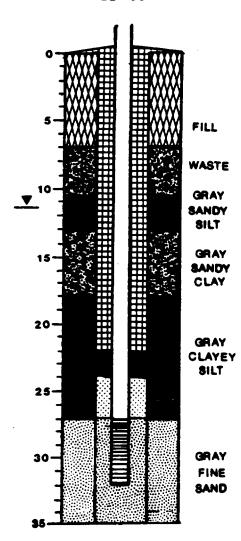
Boring/Well No. H-7

Sample Depth Bl	ow Count	Description
1 - 2.5 1	.2-14-16	FILL consisting of black silty CLAY with crushed limestone and brick fragments. Dry. Fill discontinues @ approx. 3'.
3.5 - 5	2-4-5	Gray stiff very silty CLAY. Trace of fine grain sand. Moist. Chemical odor.
6 - 7.5	3-2-3	Same as above. Some black and dark gray staining. Gasoline odor.
8.5 - 10	3-4-6	Same as above. No staining. Slight odor.
11 - 12.5	2-3-4	Brown and gray (mottled) firm very silty CLAY. Occasional silt stringers. Moist. No odor.
13.5 - 15	3-3-4	Same as above. Water # 15.5'.
16 - 17.5	1-1-2	Brownish-gray loose fine grain SAND. Some silt. Occasional iron stained pockets. Wet.
18.5 - 20	1-1-5	Brown loose fine to medium grain SAND. Trace of silt. Well sorted and rounded. Wet. Start sampling interval @ 20'.
23.5 - 25 3	-8-14	Reddish-brown dense coarse grain SAND. Trace of small gravel. Some fine to medium grain sand. Poorly sorted and well rounded. Black stained sand seam (2") @ 24.5'. Wet.
28.5 - 30 7	-9-13	Grayish-brown dense fine to medium grain SAND. Well rounded and sorted. Wet.
33.5 - 35	2-12-14	Brown dense fine grain SAND. Trace of medium grain sand. Well sorted and rounded. Wet.
38.5 - 40	-12-20	Gray very dense fine grain SAND. Occasional natural organic layers. Wet.
43.5 - 45 1	0-25-30	Natural wood. (apparently drill and sample a buried tree @ 43')
48.5 - 50	7-9-7	Gray firm fine to coarse grain SAND. Rounded, wet.
	į	E.O.B. @ 50'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-12-87
Prepared by	Kevin Phillips

Description

EE-03



Boring/Well No. H-8/EE-03
Location Site H
Owner IEPA Top of Inner Casing Blev. 411.47
Top of Inner Casing Elev. 411.47
Drilling Firm Fox drilling
Driller Jarry Mannes
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/9 & 1/12/87
State & Completion Dates 1/9 & 1/12/8/
Type of Rig Mobile 8-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 35.0 ft. Casing and Screen Diam. 2 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in
terring and Serven Diam. 2 In.
Screen Type stainless steel 0.01" slot
Screen Type stainless steel 0.01" slot
Stickup 2.36
Well Type monitoring
Well Construction:
Filter Pack 32 - 24 ft. Seal 24 - 22 ft.
3041 24 - 22 10.
Grout 22 ft. to surface
Lock No. 2834
TEST DATA
Static Water Elev.   394.74   Date   3-26-87
Static Water Elev. 398.72 Date 5-11-87
Slug Test Yes X No
Slug Test Yes X No Test Date 5-11-87 Hydraulic Conductivity 10 x 10-3 cm/sec
Hudraulic Conductivity 10 x 10°3cm/sec
Other of - 3.3
Other <u>pH</u> = 7.3
Cond. = 2800 umhos Temp. = 56° F
Yellowish
WATER QUALITY
_
_
_
_
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken   Yes X   No
Samples Taken   Yes X   No
Samples Taken   Yes X   No No. of Samples   1 round
Samples Taken   Yes X   No
Samples Taken   Yes X   No
Samples Taken         Yes X         No           No. of Samples         1 round           Types of Samples         groundwater    Date Sampled 3-17-87  Samplers E 4 E  Samples Analyzed for HSL compounds
Samples Taken         Yes X         No           No. of Samples         1 round           Types of Samples         groundwater    Date Sampled 3-17-87  Samplers E 4 E  Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken         Yes X         No           No. of Samples         1 round           Types of Samples         groundwater    Date Sampled 3-17-87  Samplers E 4 E  Samples Analyzed for HSL compounds
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-17-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

Site Dead Creek Site-H	Boring/Well No.	H-8/well #EE-03
------------------------	-----------------	-----------------

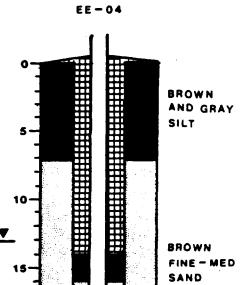
Sample Depth B	low Count	Description
		0-1.5 Black cinders
1 - 2.5	4-5-7	1.5-2.5 Brown and gray silty CLAY. Trace of small gravel, brick, and concrete fragments.
3.5 - 5	4-5-1	FILL same as above.
6 - 7.5	8-12-11	FILL consisting of black and gray silty CLAY (possibly stained). 2 inches of black granular material and small spherical beads @ 7'. WASTE (moist)
8.5 - 10	30/2	WASTE - no recovery (rod bounced, probably rubber material).
		Water @ 11' while drilling.
11 - 12.5	1-1-1	Gray very sandy SILT. Some fine grain sand. Wet. Slight chemical odor
13.5 - 15	2-3-5	Gray firm very sandy silty CLAY. Some fine grain sand and silt. Horisontally bedded and slightly varved. Occasional fractures containing iron-like staining. Moist.
16 - 17.5	1-2-3	Same as above; bedding is $1/8$ " to $1/4$ " thick. Occasional fractures and root trails or burrows.
18.5 - 20	1-1-1	Gray loose very clayey SILT, some fine grain sand. No bedding. Wet.
21 - 22.5	1-2-3	Same as above; slightly bedded ( 1/8") and slightly varved.
23.5 - 25	1-1-1	Same as above.
26 - 27.5	3-4-7	Same as above. (Fine grain sand in tip of spoon).
28.5 - 30	6-6-10	From 27' dark gray fine grain SAND. Wet. Slight chemical odor.
33.5 -35	3-9-9	Firm gray fine to coarse grain SAND. Wet. Well rounded.
		E.O.B. @ 35'

~

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-13-87
Prepared by	Kevin Phillips

20-

Description



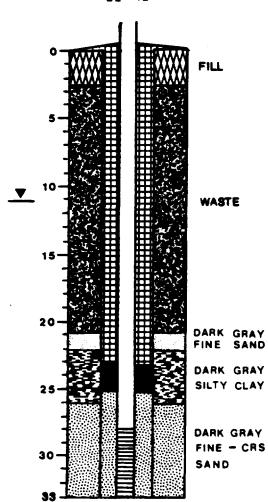
Boring/Well No. H-9/EE-04
Location Site H
Owner IZPA Top of Inner Casing Elev. 413.26
Top of Inner Casing Elev. 413.26
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/13, 1/13/87
Start & Completion Dates 1/13, 1/13/87
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 25 ft.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in. Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.93 ft.
Well Type monitoring
Well Construction:
Pilter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Pilter Pack 23 - 16 ft.  Seal 16 - 14 ft.  Grout 14 ft. to surface  Lock No. 2834
2001
TEST DATA
Static Water Elev. 398.07 Date $\frac{3-26-87}{5-11-87}$ Static Water Elev. $\frac{399.01}{5-11-87}$
Static Water Elev. 399.01 Date 5-11-87
Slug Test   Yes X   No
Hydraulic Conductivity 5.2 x 10 cm/sec
Other pH = 7.2
Other pH = 7.2 Cond. = 2000 umhos Temp. = 58° P
Clear-yellow
WATER QUALITY
Complex Websen - Ves V - No.
Samples Taken Yes X NoNo. of Samples 1 round
Types of Samples groundwater
Pate demaled 3-17-47
Date Sampled 3-17-87
Samples E & E Samples Analyzed for HSL compounds
Colit Camples Van Me V
Split Samples Yes No X Recipient
Comments Subsurface soil sample
from boring from 15 - 25' analyzed
for HSL organics
REMARKS

Sample Depth	Blow Coun	Description				
1 - 2.5	5-5-3	$\frac{0-2'}{2-2.5'}$ Firm brownish-gray clayey SILT. Trace of fine grain sand. Hoist.				
3.5 - 5	3-4-6	Stiff brown and gray (mottled) very silty CLAY. Trace of fine grain sand. Occasional clayey silt layers ( 2"). Moist.				
6 - 7.5	3-5-8	Same as above; becomes increasingly siltier at 7' then grades into brown very fine SAND at 7 $1/4'$ . Trace of silt. Dry.				
8.5 - 10	3-5-7	Brown very fine grain SAND. Trace of silt. Dry.				
11 - 12.5	2-2-5	Same as above; a 4 inch silty clay layer appears at 12'. Trace of fine grain sand.				
13.5 - 15	2-6-8	Brown fine grain SAND. Wet.				
16 - 17.5	2-6-7	Brown fine grain SAND. Some medium grain sand. Wet.				
18.5 - 20	1-1-3	Brown medium grain SAND. Trace of coarse grain sand. Wet.				
23.5 - 25	7-14-11	Brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet.				
		E.O.B. @ 25'				

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-28-87
Prepared by	Tim Meley

Description





Location Site I	
Owner IEPA	
Top of Inner Casing Elev. 409.16	
Deilling Sign Pow deilling	
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/27-1/28/	
Driller Jerry Hammon	
Start & Completion Dates $\frac{1/27-1/28}{}$	107
Type of Rig Mobile B-61	
Method of Drilling 3 3/4" I.D.	
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary	
WELL DATA	
Hole Diam. 8 in. Boring Depth 33.5 ft. Casing and Screen Diam. 2 in.	
Boring Depth 33.5 ft.	
asing and Screen Diam. 2 in.	
screen Interval 28 - 33 ft.	
Torono Burno estadalado estanti A Att	1 - 4
screen Type stainless steel 0.01" s	TOE
stickup 0.52 ft.	
well Typemonitoring	
Well Construction:	
Filter Back 11 - 25 ft Manua	1
Seal 25 - 23 ft.	-
3081 25 - 23 Ft.	
Grout 23 ft. to surface	
Lock No. 2834	
TEST DATA	
Static Water Elev. $397.43$ Date $3-26$ Static Water Elev. $398.65$ Date $\overline{5-11}$	-87
Static Water Elev. 398.65 Date 5-11	-87
Slug Test Yes No	X
Slug Test Yes No No	<del></del>
Hydraulic Conductivity	
mydraulic conductivity	
Other pH = 7.4	
Cond. = 3200 umhos Temp. = 58° F	
	_
WATER QUALITY	
Samples Taken Yes X No No. of Samples 1 round	
No. of Samples 1 round	
Tunes of Comples	—
Types of Samples groundwater	
Date Sampled 3-23-87	
Samplers E & E	_
/	—
Samples Analyzed for HSL compounds	—
Samples Analyzed for HSL compounds  Split Samples Yes X No	_
Samples Analyzed for HSL compounds  Split Samples Yes X No	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro	
Samples Analyzed for HSL compounds  Split Samples Yes X No	_
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' analyzed for	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' analyzed for	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' enalyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' enalyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' enalyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' enalyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' enalyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' enalyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.	
Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.	

Sample Depth	Blow Count	Description				
		Crushed limestone and gravel on surface - parking lot for semi-trailers.				
1 - 2.5	5-6-7	FILL consisting of brown-black sandy CLAY including a mixture of asphalt, fine to coarse grain sand, large gravel, and slag. Dry.				
3.5 - 5	3-4-6	WASTE consisting of brown-black gravelly SAND including slag, stained paper and wood products, and a white gravelly substance. Dry.				
6 - 7.5	3-5-4	WASTE. Same as above; with more slag and small spherical beads. Dry.				
8.5 - 10	7-2-1	WASTE - poor recovery; probably same as above.				
11 - 12.5	4-2-1	WASTE - same as above; wet.				
13.5 - 15	7-10-14	WASTE consisting of black (oily stained) sludge-like material including wood chips, coarse grain sand, and concrete fragments. Wet.				
16 - 17.5	1-3-4	WASTE. Same as above; with brick and concrete fragments, sand and gravel, and soft clay. Wet.				
18.5 - 20	4-3-1	WASTE. Same as above. Fill material discontinues @ 21'.				
21 - 22.5	0-0-2	21-22' Dark gray fine grain SAND. Some black staining. Wet. 22-22.5 Dark gray silty CLAY. Hoist.				
23.5 - 25	2-2-2	Dark gray silty CLAY. Moist.				
26 - 27.5	0-0-1	Dark gray to black fine grain SAND. Trace of silt and medium grain SAND. Wet.				
28.5 - 30	6-8-10	Dark gray medium to coarse grain SAND. Wet.				
31 - 32.5	7-8-9	Same as above; with a trace of small gravel. Wet.				
•		E.O.B. # 33.5"				

Project Name 1	Dead Creek		Boring/Well No. I-2
Project No.		<del></del>	Location Site I
Date Prepared	1-28-87		Owner IEPA
Prepared by T:	im Maley	<del></del>	Top of Inner Casing Elev. NA
		<del>.</del>	Drilling Firm Fox drilling
Depth (ft)	Descri	ption	Driller Jerry Hammon
			Start & Completion Dates 1/28, 1/28/87
			Type of Rig Mobile B-61
•	i <b> 2</b>		Method of Drilling 3 3/4" I.D. hollow
			stem augers and rotary
	XXXXXXXXXXXXXXI		<del>- 111 - 111</del>
1			WELL DATA
1	***************************************		Mail - Man - A do
<b>1</b> ////	<b>YYYYYYYY</b>	FILL	Hole Diam. 8 in. Boring Depth 40 ft.
_ <u>T</u> YYYY	^^^^		Casing and Screen Diam.
	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		Screen Interval
TKXXXI	<b>XXXXXXXXXXXX</b>		Screen Type
	ストラング		Stickup
			well type
			Well Construction: Filter Pack
			Seal
	્તું જે જો જો હતું હતું		Grout
			Lock No.
100	4.75		TEST DATA
16		WASTE	1801 IMIN
			Static Water Elev Date
	1 3 mg 1 mg 1 mg 1 mg 1 mg 1 mg 1 mg 1 m		Static Water Elev. Date Slug Test Yes No Test Date
- 200			Slug Test Yes No No
			Test Date Hydraulic Conductivity
20-22-			Other
-100			
-13:43			
-		BLACK AND GRAY SILT	MATER QUALITY
25-		BEACK AND GRAY SILT	Samples Taken Yes No_X
-			No. of Samples
4			Types of Samples
4			
	i		Date Sampled
30-	· ·		Samplers
7			Samples Analyzed for
7	•	GRAY FINE SAND	
7		GRAF FIRE SAILS	
35-			Split Samples(soil)Yes X No
•••]			Recipient Sverdrup, Inc. for Cerro
3			Copper
1			Comments Subsurface soil samples
4			from boring 5 - 25' analyzed for
ــــــــــــــــــــــــــــــــــــــ			HSL compounds.
- <del> </del>			
			REMARES
			Ground elev. 109.98

- (13) 760 mm of Hg (29.92 in. of Hg)
- (14) 25°C (77°F)

### **CALIBRATION WORK SHEET**

().	(2)	(3)	(4)	(5)	(6)	(7)	(8)	For application see ref. 1
Run Point No.	Elapsed Time - Δt Min.	Initial Volume V <sub>m</sub> M3	Meter Inlet Static Pressure - △P in. of Hg	Standard Volume V <sub>STD</sub> M3	Calibrator Orifice Static Press. ΔH in. of H <sub>2</sub> O	Flow Rate O <sub>STD</sub> M3/min.	Flow Rate: O <sub>STD</sub> ft3/min.	$ \sqrt{\Delta H}  \left(\frac{P_1}{P_{STD}}\right)  \left(\frac{536.58}{T_1}\right) $
1	6.994	11	0.1	1-012	2.0	a 145	5.1	
2	4.178	(	0.4	1.005	5.5	0.241	B.5	
3	3.356		0.6	0.948	8.5	0.247	<u>/0.5</u>	
4	2.865		0.8	0.991	11.5	0.346	12.2	
5	2.538		1.0	0.984	14.5	0.388	13.7	
6								•
7	<del></del>	<del></del>	<del></del>					

(9)	P1:	24.76	in. of Hg
-----	-----	-------	-----------

(10)

\_\_\_\_ °F + 459.58 = °R

Roots Meter No.:.

**Calibrator Orifice:** 

Serial No.:

Calibration performed by:

Date of Calibration: .

Date placed in service:\_ (To be noted by user)

### **EQUATIONS**

$$V_{STD} = V_{m} \frac{(P_{1} - \Delta P) \quad T_{STD}}{P_{STD} \quad T_{1}}$$
$$= (3) \frac{(9) - (4) \quad (14)}{(13) \quad (10)}$$

$$Q_{STD} = \frac{V_{STD}}{\Delta t}$$

$$= \frac{(5)}{\Delta t}$$

 $M3 \times 35.31 = Ft^3$ 

For additional information consult:

1. The Federal Register, Vol. 47, No. 234, pp. 54896-54921, December 6, 1982

- Notes: 1. EPA recommends calibrators should be recalibrated after one year of field use.
  - 2. Copies of this calibration are not kept on file.

# CALIBRATOR ORIFICE for HIGH VOLUME AIR SAMPLER

CERTIFICATE of CALIBRATION

SERIAL NO. 45-C



High Volume Sampler
Calibration Data

# APPENDIX C

# AIR SAMPLING FLOW VOLUME CALCULATIONS AND CALIBRATION DATA

Sample Dept	h Blov Coun	t Description
		Spent coal coke in piles on surface.
		Straight drill to 30'.
		Stratigraphy sequence based on auger cuttings.
		$0-20$ FILL consisting of black cinders, slag gravel, and fine to coarse grain send. Dry. Fill probably discontinues $\theta$ approx. 20'.
		20-28.5 Brown-gray SILT. Trace of clay.
28.5 - 30	8-12-15	Gray very fine grain SAND. Trace of silt.
33.5 - 35	8-13-18	Same as above. Trace of coarse grain sand.
38.5 - 40	7-10-14	Same as above.
		E.O.B. # 43'.

	3146	Boring/Well No. Q-8/EE-19
Project No. IL		Location Site Q
Date Prepared 2	-10-8 /	Owner IEPA
Prepared by Tim	Maley	Top of Inner Casing Elev. 423.22
		Drilling Firm Fox drilling
Depth (ft)	Description	Driller Jerry Hammon
		Start & Completion Dates 2/10,2/10/87
		Type of Rig Mobile B-61
	EE-19	Method of Drilling 3 3/4" I.D.
		hollow stem augers, Rotary
	1 1	
	<u> </u>	WELL DATA
0 111111		
- <b>I</b> /////F	## #########	Hole Diam. 8 in.
- <b>I</b> YYYYYE		Boring Depth 43 ft.
-TAXXXXE		Casing and Screen Diam. 2 in.
JYYYYE		Screen Interval 37.5 - 42.5 ft.
		Screen Type stainless steel 0.01" slot
	EE ##XXXXXII	Stickup 2.1 ft.
	HI HIKKKI FILL	Well Type monitoring
		Well Construction:
-18.83.83.33	# ######	Filter Pack 42.5 - 29 ft. Natural
-1,2,2,2,2,2	## ###################################	Seal 29 - 27.5 ft.  Grout 27.5 ft. to surface
10-WWW	# # # # # # # # # # # # # # # # # # # #	Lock No. 2834
- <b>I</b> AAAAA <del>I</del>	## ###################################	LOCK NO
<b>-KXXXXI</b>	<b>                                       </b>	TEST DATA
<b>1</b> ////#	# ## <b>\</b> \\\\	Static Water Elev. 399.27 Date 3-26-87
. TYYYYH	# ###/	Static Water Elev. 403.24 Date 5-11-87
19 <b>~{</b> }}}	# ##{\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Slug Test Yes No X
TYYYY)#	# ####	Test Date
TXXXXXIF	# # # # # # # # # # # # # # # # # # # #	Hydraulic Conductivity
TXXXXII		Other Duplicate of DC-GW-07
<b>-</b> #XXXXIE	<del>13                                     </del>	
20-11111	33	
▼ 1		WATER QUALITY
	# ## <b>***</b>	water Angelli
	BROWN AND	Samples Taken Yes_X_ No
-	GRAY SILT	No. of Samples 1 round
25-		Types of Samples groundwater
-		2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
-		Date Sampled 3-16-87 Samplers E & E
4 #		Samples Analyzed for HSL compounds
30-  [		Jespies Rielysee for
4 1		
		Split Samples Yes No_X
	GRAY	Recipient
35-]	FINE	
7		Comments
7 1	SAND	
I I		
40-		REMARKS
43.1		
II		<del></del>
43 1		
<del></del>		

.

- • •				
Site	Dead	Creek	Site-Q	

### Boring/Well Ho. Q-7/Well #EE-18

Sample Depth	Blow Count	Description
		Black cinder fill on surface.
		Straight drill to 20'.
		Stratigraphy sequence based on auger cuttings.
		0-18' FILL consisting of black clayey SAND with some black cinders, slag material, plastic and paper products, and wood chips.
18.5 - 20	10-17-24	Dark brown - dark gray SILT. Trace of very fine grain sand. Moist. Rust color and oil-like staining. Laminated.
23.5 - 25	4-4-5	Same as above.
28.5 - 30	3-5-8	Brown fine to medium grain SAND. Wet.
33.5 - 35	4-6-10	Same as above.
38.5 - 40	3-5-10	Becomes gray. Same as above. Trace of coarse grain sand.
		E.O.B. @ 43.5'.

Project Name Project No.  Date Prepared Prepared by  Tim Ha	<del>0</del>	Boring/Well Mo. Q-7/EE-18 Location Site Q Owner IEFA Top of Inner Casing Elev. 419.54 Drilling Firm Fox drilling
Depth (ft)	Description	Driller Jerry Hammon Start & Completion Dates 2/9/87,2/9/87 Type of Rig Mobile B-61
EE -	- 18 1	Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
15   20   25   30   1   35   43.5	BROWN AND GRAY SILT  BROWN AND GRAY FINE - ME SAND	Hole Diam. 8 in.  Boring Depth 43.5 ft.  Casing and Screen Diam. 2 in.  Screen Interval 38 - 43 ft.  Screen Type stainless steel 0.01° slot Stickup 1.34 ft.  Well Type monitoring  Well Construction:  Filter Pack 43 - 27 ft. Natural Seal 27 - 25 ft.  Grout 25 ft. to surface  Lock No. 2834  TEST DATA  Static Water Elev. 395.10 Date 3-26-87 Static Water Elev. 396.26 Date 5-11-87 Slug Test Yes No X  Test Date  Hydraulic Conductivity Other High oil content, strong odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples 1 groundwater  Date Samples 2 & E  Samples Analysed for HSL compounds  REMARKS

----

Sampl	e Dep	th B	low (	Count
-------	-------	------	-------	-------

## Description

		Well vegetated fill on surface.
1 - 2.5	5-6-6	FILL consists of brown silty CLAY. Trace of fine grain sand.
3.5 - 5	3-3-5	FILL consisting of dark brown silty CLAY and brown fine grain sand. Layered. Dry.
6 - 7.5	12-20-22	PILL consisting of brown very fine grain SAND. Some silt. Dry.
8.5 - 10	13-20-40	FILL consisting of brown silty clay and fine grain sand. Trace of coarse grain sand and brick fragments.
11 - 12.5	6-9-5	FILL consisting of brown medium to coarse grain SAND. Trace of small to large gravel and crushed limestone. Dry. Fill discontinues @ 14'.
13.5 - 15	4-4-5	Brown SILT. Trace of very fine grain sand. Dry.
18.5 - 20	4-4-7	Light brown fine grain SAND. Dry.
23.5 - 25	9-18-20	Same as above.
28.5 - 30	10-15-19	Light brown medium grain SAND. Trace of coarse grain sand and small gravel. Met # 30'.
33.5 - 35	11-14-20	Same as above.
38.5 - 40	12-14-16	Same as above.
		E.O.B. @ 43'.

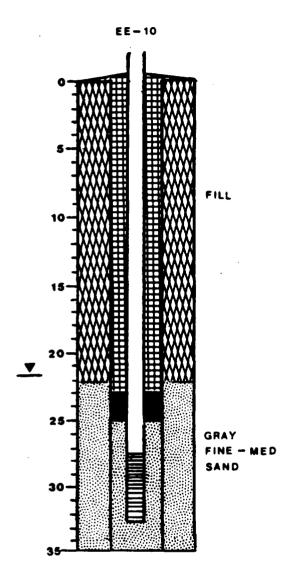
Project Name D	ead Creek 3140	<del></del>	Boring/Well No. Q-6/EE-17 Location Site Q
	2-6-87	<del></del>	Owner IEPA
Prepared by 1	m Maley		Top of Inner Casing Elev. 423.06
			Drilling Firm Fox drilling
Depth (ft)	Descri	ption	Driller Jerry Hammon Start & Completion Dates 2/6/87,2/6/87 Type of Rig Mobile B-61
	EE - 17		
	1.1		Method of Drilling 3 3/4" I.D. hollow stem augers and rotary
0 - 101000		<b>T</b>	WELL DATA
<b>-</b>	## ##WW		Hole Diam. 8 in.
<del>-1</del> /////		AI .	Boring Depth 43 ft.
1000	## ###W	VI	Casing and Screen Diam. 2 in.
_ 100000		y	Screen Interval 38 - 43 ft. Screen Type stainless steel 0.01" slot
5- <b>XXXX</b>		(1	Stickup 1.06 ft.
1	H	FILL	Well Type monitoring
7		V	Well Construction:
1000	## ## <b>#</b>	đ	Filter Pack 43 - 34.5 ft.
100000	HI HIYYY	Y	Seal 34.5 - 32.5 ft.  Grout 32.5 ft. to surface
10-())))))		a	Lock No. 2834
<b>1</b>		<b>)</b>	
70000		<b>S</b>	TEST DATA
4	# ##***	1	Static Water Elev. 394.97 Date 3-26-87
15-		850WN 645	Static Water Elev. 396.26 Date 5-11-87
-		BROWN SILT	Slug Test Yes No X
adaption to the			Test Date Hydraulic Conductivity
			Other pH = 7.0
			Cond. = 1500 unhos Temp. = 56° P
20-		1	
1 1	<b>83 83</b> •		
1 1	## ##	BROWN	MATER QUALITY
1		FINE SAND	Samples Taken Yes X No
1.54	<b>88 88 88</b>	Ì	No. of Samples 1 round
25-	###		Types of Samples groundwater
▼ 1 1	⊞ ⊞		
	<b>##</b>		Date described 3 16 47
	H = H		Date Sampled 3-16-87 Samplers E 6 E
30-			Samples Analysed for HSL compounds
-			
-		Į	
		ł	Split Samples Yes No_X_
		BROWN	Recipient
35-		MEDIUM SAND	
-		MEDIUM SAND	Comments
-			
-			
<b>†</b>			
40-₹			REMARKS
4			Background location
43	AND DESCRIPTION		

	Bood	Crock	Site-Q
31 T O	Deed	CLOOK	21.co-G

#### Boring/Well No. Q-5/Well #EE-10

Sample Depth B	llow Count	Description
		FILL materials on surface.
3.5 - 5	3-37-7	FILL consisting of black clayey sand with some black cinders, fly ash, wood chips, and fine to coarse grain sand. Dry.
8.5 - 10	2-4-2	Same as above.
13.5 - 15	KA	No recovery. Possible rubber tire.
8.5 - 20	MA	No recovery - fill apparently discontinues # 22'.
3.5 - 25	MA	No recovery.
18.5 - 30	4-4-4	Gray fine to medium grain SAND. Wet.
13.5 - 35	22-20-22	Same as above.
:		E.O.B. @ 35'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-22-87
Prepared by _	Tim Haley



Location Site Q
Pocacion Pres A
Owner TEPA
Top of Inner Casing Elev. 419.40
Top or inner casing siev. 419.40
Drilling Firm Fox drilling
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/22-1/22/87
00 - 1 - Complete - Date - 1 - 12 - 1 - 12 - 12 - 12 - 12 - 12
Start & Completion Dates 1/22-1/22/87
Type of Rig Mobile B-61
· ·
Method of Drilling _3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in.  Boring Depth 35 ft.  Casing and Screen Diam. 2 in.  Screen Interval 27.5 - 32.5 ft.  Screen Type stainless steel 0.01° slot
1014 P181.
Boring Depth
Casing and Screen Diam. 2 in.
****** ******
3cteen Intervet
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft. Well Type monitoring
Mall Control of the state of th
well Typemonitoring
Well Construction:
Pilter Pack 32.5 - 25 ft.
FAILUR FOCK 34.3 - 43 IC.
Seal 25 - 23 ft.
Seal 25 - 23 ft. Grout 6 ft. to surface
Lock No. 2834
TEST DATA
Static Water Elev. $395.37$ Date $3-26-87$ Static Water Elev. $395.44$ Date $5-11-87$ Slug Test Date
Static Mater Elev. 188 44 Data 8-11-47
302016 Maret Blev. 393.44 Date 3-11-67
Slug Test Yes No X
Test Date Hydraulic Conductivity
Produced in Conduction
HAGISTIC CONGRESSIAS
Other DH = 6.8
other pH = 6.8
cond. = 3800 umbos Temp. = 60° P
cond. = 3800 umbos Temp. = 60° F turbid
cond. = 3800 umbos Temp. = 60° P
cond. = 3800 umbos Temp. = 60° F turbid WATER QUALITY
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No
cond. = 3800 umbos Temp. = 60° F turbid WATER QUALITY
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers & 6 E
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cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers & 6 E
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers & 6 E
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers & 6 E
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samples & E Samples Analyzed for HSL compounds
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samples & E Samples Analyzed for HSL compounds
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor
cond. = 3800 umbos Temp. = 60° F turbid  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X  Recipient  Comments Strong hydrocarbon odor

Site	Dead	Creek	Site-Q

#### Boring/Well Bo. Q-4/Well #EE-09

Samble Debts Bloa Compt		Description	
		Brown-black silty CLAY FILL on surface. Trace of paper products and sand.	
3.5 - 5	6-7-1	No recovery - FILL	
8.5 - 10	7-17-12	No recovery - FILL  FILL consisting of brown-black SILTY CLAY with some slag gravel, brick fragments, and broken glass.	
13.5 - 15	1-0-1	FILL - same as above. Mostly black cinders, slag gravel, sand, and silt. Fill discontinues @ approx. 16'.	

18.5 - 20 9-14-17 Gray to dark gray fine to medium grain SAND. Moist.

28.5 - 30 2-3-12 Same as above.

23.5 - 25 1-2-5 Same as above. Wet.

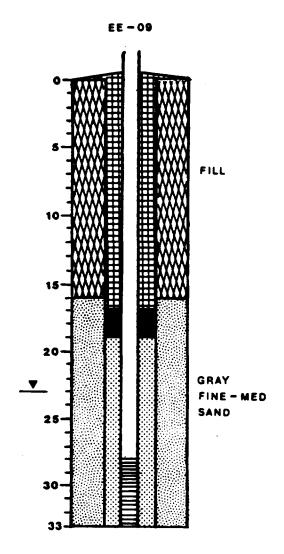
 Project Name
 Dead Creek

 Project No.
 IL 3140

 Date Prepared
 1-21-87

 Prepared by
 Tim Maley

Depth (ft)



Boring/Well No. Q-4/EE-09 Location Site Q
Owner IEPA Top of Inner Casing Elev. 415.40
Drilling Firm For Arilling
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/21-1/21/87
Start & Completion Dates 1/21-1/21/87
Type of Rig Mobile B-61
-
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in.  Boring Depth 33 ft.  Casing and Screen Diam. 2 in.
Boring Depth 33 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft. Screen Type stainless steel 0.01" slo
Streen Type Stainless Steel U.Ul- Sic
Stickup 2.02 ft. Well Type monitoring
Well Construction:
Filter Pack 33 - 19 ft. Matural
Seal 19 - 17 ft.
Filter Pack 33 - 19 ft. Natural Seal 19 - 17 ft. Grout 17 ft. to surface Lock No. 2834
Lock No. 2834
<del> </del>
TEST DATA
Static Water Elev. $395.24$ Date $3-26-8$ Static Water Elev. $395.83$ Date $5-11-8$ Slug Test Yes X Ho Ho Hydraulic Conductivity $6.90 \times 10^{-5}$ cm/se
Static Water Elev. 395.83 Date 5-11-8
Slug Test Yes X No
Test Date 5-13-87
Rydraulic Conductivity 6.90 x 10 cm/se
other <u>pH = 5.8</u> - Cond. = 1700 unhos Temp. = 62° F
Cond 1700 danos 10ap 62 F
WATER QUALITY
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples qroundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No No. of Samples 1 round Types of Samples qroundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds
Samples Taken Yes X No No. of Samples 1 round Types of Samples qroundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No
Samples Taken Yes X No No. of Samples 1 round Types of Samples qroundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No
Samples Taken Yes X No No. of Samples 1 round Types of Samples qroundwater  Date Sampled 3-16-87 Samplers E E E Samples Analyzed for HSL compounds  Split Samples Yes No Recipient
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Samples Taken Yes X No No. of Samples 1 round Types of Samples qroundwater  Date Sampled 3-16-87 Samplers E E E Samples Analyzed for HSL compounds  Split Samples Yes No Recipient
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E E E Samples Analyzed for HSL compounds  Split Samples Yes No Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E E E Samples Analyzed for HSL compounds  Split Samples Yes No Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E E E Samples Analyzed for HSL compounds  Split Samples Yes No Recipient  Comments
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E E E Samples Analyzed for HSL compounds  Split Samples Yes No Recipient  Comments

Sample Depth Blow Count		Description	
		Brown-black-gray silty clay FILL on surface.	
1.5 - 5	1-1-2	FILL consisting of black SILT. Trace of fine grain sand and black cinders. Thinnly laminated and crumbly.	
1.5 - 10	1-0-1	Same as above. Moist at 9'.	
3.5 - 15	1-0-0	Same as above. Wet. Fill apparently discontinues @ approx. 17'.	
.8.5 - 20	2-3-4	Dark gray silty CLAY. Dry.	
3.5 - 25	2-3-7	Same as above. Some mottleness. Noist at 25'.	
18.5 - 30	2-2-4	Same as above.	
33.5 - 35	3-6-13	Gray fine to medium grain SAND. Wet.	
18.5 - 40	8-20-30	Same as above.	
		E.O.B. @ 40'	

Project Name
Project No. IL 3140
Date Prepared 1-21-87
Prepared by Tim Haley Dead Creek Boring/Well No. Q-3/EE-08 Location Site Q Owner IEPA
Top of Inner Casing Slev. Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/21-1/21/87 Description Type of Rig Mobile B-61 EE-08 Method of Drilling 3 3/4" I.D. hollow stem augers WELL DATA Hole Diam. 8 in.

Boring Depth 40 ft.

Casing and Screen Diam. 2 in.

Screen Interval 33 - 38 ft.

Screen Type stainless steel 0.01° slot

Stickup 1.36 ft.

Well Type monitoring

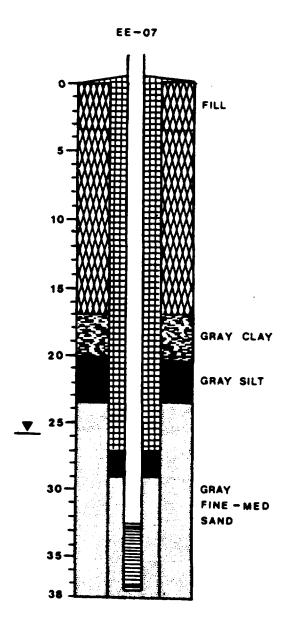
Mell Construction: FILL Filter Pack 38 - 30 ft.

Seal 30 - 28 ft.

Grout 28-26 ft and 8 ft to surface Lock No. 2834 TEST DATA Static Water Elev. 395.78 Date 3-26-87 Static Water Elev. 392.92 Date 5-11-87 Slug Test Yes X 5-13-87 Test Date Rydraulic Conductivity1.06 x 102cm/sec Other WATER QUALITY GRAY CLAY Samples Taken Yes 1 round No. of Samples Types of Samples groundwater Date Sampled 3-16-87
Samplers E 6 E
Samples Analyzed for HSL compounds Split Samples Yes\_ GRAY Recipient 35 FINE - MED SAND Comments REMARKS

Sample Depth Blow Count		Description	
		Black sandy CLAY with gravel and cinders. Fill on surface.	
3.5 - 5	КА	FILL - spoon refusal (possible rubber tire)	
8.5 - 10	MA	No recovery.	
13.5 - 15	33-10-8	FILL - poor recovery. Appears to be various debris including paper products. Fill discontinues # approx. 17'.	
18.5 - 20	5-8-13	Gray silty CLAY. Trace of very fine grain sand. Dry.	
23.5 - 25	3-4-3	Gray silt. Trace of very fine grain sand. Hoist.	
28.5 - 30	5-10-13	Gray fine grain SAND. Moist.	
33.5 - 35	6-6-13	Gray fine to medium grain SAND. Wet.	
36 - 37.5	-	Same as above.	
		B.O.B. @ 38'	

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-20-87
Prepared by	Tim Maley



Boring/Well No. Q-2/EE-07
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.31
Drilling Pirm Fox drilling Driller Jerry Hammon Start & Completion Dates 1/20-1/20/87
Driller Jerry Hammon
Start & Completion Dates 1/20-1/20/87
Start a completion bates 1/20-1/20/6/
Type of Rig. Mobile 8-61
Method of Drilling3 3/4" I.D.
hollow stem augers, Rotary
<u> </u>
WELL DATA
Hole Diam & in.
Hole Diam. 8 in. Boring Depth 38 ft.
Casing and Screen Diam. 2 in.
Casing and Serven Diam. 2 in.
Screen Interval 32.5 - 37.5 ft. Screen Type stainless steel 0.01" slot
Screen Type stainless steel 0.01" slot
Stickup 1.66 ft.
well Type monitoring
Well Construction:
Filter Pack 37.5 - 29 ft. Natural
Seal 29 - 27 ft.
Seal 29 - 27 ft. Grout 6 ft. to surface
group b re. to surrace
Lock No. 2834
TEST DATA
Static Water Elev. <u>395.48</u> Date <u>3-26-87</u>
Static Water Elev. 394.72 Date 5-11-87
Static Water Elev. 395.48   Date 3-26-87
Test Date 5-12-87
- Hudraulic ConductivityO.95 t 10 4cm/sec
Slug Test Yes X No Test Date 5-12-87 Hydraulic Conductivity0.95 x 10 cm/sec
other Conductivity0.95 k 10 cm/sec
Other Conductivity0.95 k 10 cm/sec
Other
Other WATER QUALITY
WATER QUALITY
WATER QUALITY
WATER QUALITY
WATER QUALITY
WATER QUALITY
WATER QUALITY
Samples Taken Yes_X No
Samples Taken Yes_X No
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E 6 E
Samples Taken Yes_X No
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E 6 E
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E 6 E
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E 4 E Samples Analyzed for HSL compounds  Split Samples Yes No X
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analysed for HSL compounds  Split Samples Yes No X Recipient
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments
Samples Taken Yes X No No. of Samples i round Types of Samples groundwater  Date Sampled 3-16-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes No X Recipient Comments

Sample Depth Blow Count		Description	
		Black cinder fill on surface	
1 - 2.5	9-20-22	FILL consisting of black-gray silty clay with asphalt, cinders, sand, and gravel. Dry.	
3.5 - 5	8-15-12	FILL - same as above.	
6 - 7.5	5-9-3	FILL - same as above. Some wood chips.	
8.5 - 10	3-6-2	FILL - same as above. With increased amount of debris including traces of rope, paper products, wood chips, and black stained sand.	
11 - 12.5	1-3-13	FILL - same as above.	
13.5 - 15	4-3-2	FILL - same as above. Fill discontinues @ approx. 14' then dark gray silty CLAY. Moist.	
16 - 17.5	3-5-7	Gray silty CLAY. Moist.	
18/5 - 20	2-4-4	Gray sandy SILT. Trace of very fine grain sand. Dry.	
21 - 22.5	5-5-9	Same as above.	
23.5 - 25	1-2-2	Dark gray very fine grain SAND. Some silt. Wet.	
26 - 27.5	3-7-11	Light gray fine grain SAND. Trace of silt.	
28.5 - 30	5-6-6	Gray SILT. Trace of very fine sand. Wet	
31 - 32.5	3-8-11	Same as above. More fine grain sand. Wet.	
33.5 - 35	1-3-6	Same as above.	
		E.O.B. @ 35'	

**~**-

 Project Name
 Dead Creek

 Project No.
 IL 3140

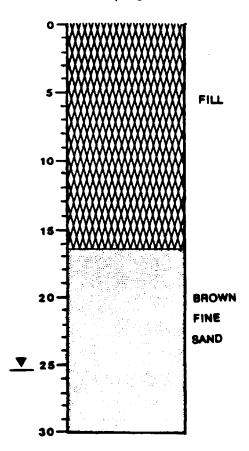
 Date Prepared
 2-11-67

 Prepared by
 Tim Maley

Depth (ft)

Description

P - 3



Boring/Well No. P-3 Location Site P	
Location Site P	
Top of Inner Casing Elev. NA	
Driller Jerry Hammon	
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 2/11, 2/11 Type of Rig Mobile B-61	/87
Type of Rig Mobile B-61	
Method of Drilling 3 3/4" I.D.	
hollow stem augers	
WELL DATA	
Hole Diam. 8 in. Boring Depth 30.0 ft. Casing and Screen Diam.	
Boring Depth 30.0 ft.	
Casing and Screen Diam.	
SCIUUM INTUIVAI	
Screen libe	
Stickup Well Type Well Construction:	-
Well Type	
Well Construction:	•
Pilter Pack	
Seal_	
Grout	
Lock No.	
Lock No.	
TEST DATA	
Static Water Elev. Date Static Water Elev. Date Slug Test Yes No Test Date Hydraulic Conductivity	
Static Water Flow	
Alue Cost	
2109 1086 108 NO	
Tost pate	
Hydraulic Conductivity	
Other	
	_
WATER QUALITY	
Samples Taken Yes No.	¥
To of Samples	
Samples Taken Yes No. No. of Samples Types of Samples	
Types of Samples	
Date Sampled	
Samplers Samples Analyzed for	
Samples Analyzed for	
<del></del>	
Split Samples Yes No	X
Recipient	
-	
Comments	
<del></del>	
REMARS	
Ground elev. 419.36	

Sample Depth B	low Count	Description	
		Crushed limestone on surface.	
1 - 2.5	5-6-7	FILL consisting of black-brown sandy CLAY with various debris including paper and plastic products, wood chips, slag, small gravel, fine to coarse grain sands, and brick fragments. Dry.	
3.5 - 5	3-3-7	Same as above.	
5 - 7.5	3-4-4	Same as above.	
8.5 - 10	2-6-6	Same as above.	
11 - 12.5	5-5-7	Same as above.	
13.5 - 15	7-7-8	Same as above.	
16 - 17.5	1-3-14	Same as above. Moist.	
8.5 - 20	5-6-8	Same as above.	
21 - 22.5	5 - 50/3	Same as above. Spoon refusal.	
13.5 - 25 10	)-6-28	Same as above. Poor recovery.	
26 - 27.5	1-5-5	No recovery. Probably same as above.	
		FILL apparently discontinues @ 28'.	
28.5 - 30	5-9-12	Dark gray fine to medium grain SAND. Moist.	
13.5 - 35 7	7-11-10	Brown medium grain SAND. Wet.	
18.5 - 40 7	/-12-14	Dense brown fine to medium SAND. Wet.	
		E.O.B. @ 40'.	

Project NameDe	ead Creek	Boring/Well No. P-2	
Project No. IL		Location Site P	
Date Prepared	2-11-87	Owner IEPA	
Prepared by Ti	n Maley	Top of Inner Casing Elev. NA	
		Drilling Firm Fox drilling	
Depth (ft)	Description	Driller Jerry Rammon	
		Start & Completion Dates 2/11, 2/11/87	
	P - 2	Type of Rig Mobile 8-61	
	•	Method of Drilling3 3/4" I.D.	
0 7		hollow stem augers	
, JWW	<b>//////////////////////</b>		
<b>T</b> YYYY	<b>^</b>	WELL DATA	
<b>1</b> (YYYY)	YYYYYYYYYY <b>I</b>		
TYYYYY	<b>YYYYYYYYY</b>	Nole Diam. 8 in.	
_ <b>TK</b> XXXXX)	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Boring Depth 40.0 ft.	
5{}}}	XXXXXXXXXXXXXX	Casing and Screen Diam.	
<b>-1</b> 000000		Screen Interval	
1		Screen Type	
- <b>1</b> WW	<b>WWW.WWW.</b>	Stickup	
- <b>-</b>	MMMMMM FILL	Well Type	
10-{}}	WWWWWI "I'L	Filter Pack	
-{/////	MMMMMMI	Seal	
-1XXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	Grout	
-{\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	(XXXXXXXXXXXXX)	Lock No.	
	XXXXXXXXXXXXI	· · · · · · · · · · · · · · · · · · ·	
WW	XXXXXXXXXXXI	TEST DATA	
, and a	AAAAAAAAAI		
<b>]</b>	<b>WWWWWW</b>	Static Water Elev Date	
<b>3</b>	<b>/////////////////////////////////////</b>	Static water Elev. Date	
<b>1MMM</b>	<b>YYYYYYYYYY</b>	Slug Test Yes No No Test Date	
7	YYYYYYYYYYI	Test Date Hydraulic Conductivity Other	
20-1000	<i>(</i>	Other	
TXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
<b></b>	KXXXXXXXXXXXX		
1,,,,,,,			
<b>1</b>	WWW.WW.W	WATER QUALITY	
25 <b></b>  //////	^^^^		
- <b>/</b> /////	<b>/////////////////////////////////////</b>	Samples Taken Yes No X	
- <b>I</b> YYYY	^^^^	No. of Samples Types of Samples	
	V0VVV0V0V0V0V0V		
-			
₩ 30-		Date Sampled	
<del>-</del>		Samplers	
-	BROWN	Samples Analysed for	
	FINE - MED		
	SAND		
35-		Split Samples Yes No X	
		Recipient	
		Comments	
40			
40			
		2041224	
		REMARES Ground elev. 423.62	
		GEOUNG WIEV. 923.02	
•			

Site Dead Creek Site-F	Boring/Well No.	P-1
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Sample Depth Blow Cou	nt Description
	Crushed limestone on surface.
1 - 2.5 4-3-3	FILL consisting of black sandy CLAY with crushed limestone, slag gravel, coal, and cinders.
3.5 - 5 4-3-3	Same as above.
6 - 7.5 5-7-25/3	FILL consisting of various debris including paper and plastic products, slag gravel, asphalt, and silty clay. Large obstruction encountered # 7.5'.
8.5 - 10 6-12-10	FILL consisting of brown silty CLAY with various debris including paper products, small gravel, and fine to coarse grain sand. Wet.
11 - 12.5 6-17-3	Same as above.
	FILL discontinues @ 13.5'
13.5 - 15 3-6-7	Dark brown-dark gray silty CLAY. Slightly mottled. Trace of very fine grain sand. Dry.
16 - 17.5 2-4-6	Same as above to 17'.  4" layer of gray fine grain sand @ 17-17 1/3'. Dry. Then dark gray SILT. Trace of very fine grain sand. Dry.
18.5 - 20 3-5-8	Dark gray very fine grain SAND. Trace of silt. 2" gray silty clay layer @ 19'.  Then light gray fine to medium grain SAND. Dry.
21 - 22.5 6-10-12	Brown medium grain SAND. Trace of coerse grain sand and small gravel.  Dry.
23.5 ~ 25 6-13-12	Same as above.
28.5 - 30 2-5-7	Same as above.
33.5 - 35 3-5-10	Same as above. Wet.
	E.O.B. @ 35'.

Project Name Dead Creek		Boring/Well No. P-1
Project No. IL 3140		Location Site P
Date Prepared 2-11-87		Owner IEPA
Prepared by Tim Haley		Top of Inner Casing Elev. MA
		Drilling Firm Fox drilling
Depth (ft) Der	scription	Driller Jerry Hammon
•	•	Start & Completion Dates 2/11, 2/11/87
		Type of Rig Mobile 8-61
P - 1		Type of kid
P = 1		Method of Drilling 3 3/4" I.D.
07000	<b>⇔</b>	hollow stem augers
<b>PSSS</b>	84	
	<b>8</b> 3	WELL DATA
<b>1555555</b>	<b>₹</b> 8	
188888	<b>8</b> 9	Hole Diam. & in.
<del> 22333</del>	81	Boring Depth 35.0 ft.
s-88888	SSI FILL	Casing and Screen Diam.
	<b>₩</b>	Screen Interval
<b>1888888</b>	<del>8</del>	Screen Type
18888	<b>됬</b>	Stickup
- <del>                                     </del>	<b>≋</b>	Well Type
	<b>⊠</b>	Well Construction:
1888	84	
10-16-8888888888888888888888888888888888	⋘	Filter Pack
1833333	<b>S</b>	Seal
<b>88888</b>	<b>8</b> 3	G190£
	<b>×</b>	Lock No.
1337265	日本 BROWN AND GRAY	TEST DATA
15-1-1-3	ALL DO ALAY	
	SILTY CLAY	Static Water Elev Date
	<b>553</b>	Static Water Elev. Date
		Static Water Elev Date Slug Test Yes No
	DARK GRAY SILT	Total Baka
	-3E	Hydraulic Conductivity
20-		Other
		Other
		<del></del>
	300000 3000000	
-		WATER QUALITY
25-		
	BROWN FINE - MED	Samples Taken Yes No X
	BHOMN LINE - MED	No. of Samples Types of Samples
		Types of Samples
-	SAND	
30-	96 W.C. 196 W.C.	Date Sampled
30	1971	Samplers
		Samples Analyzed for
		Anilih Annolog Yan Ma Y
35		Split Samples Yes No X
		Recipient
		Comments Subsurface soil samples
		from boring 0 - 10' and 25 - 35'
		analyzed for HSL compounds.
		renares
		Ground elev. 418.41
	•	

Site Dead Creek Site-O	Site	Dead	Creek	Site-0	
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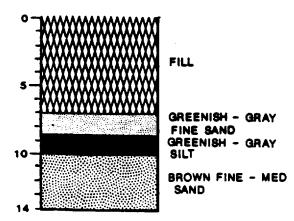
Boring/Well	So.	0-10

Sample Depth	Blow Count	Description
0 - 1	Hand auger	FILL consisting of red-brown sandy silty CLAY
1 - 3.5	Hand auger	FILL consisting of black cinder-like material. Dry.
3.5 - 5	Hand auger	FILL consisting of black cinders. Dry.
5 - 7	Hand auger	FILL consisting of black to greenish-black sludge-like material and soft silty clay. Wet.
		Fill discontinues € 7'.
7 - 8.5	Hand auger	Greenish-gray fine grain SAND. Black staining throughout. Wet.
8.5 - 10	Hand auger	Greenish-gray very sandy SILT. Black staining. Very moist.
10 - 14	Hand auger	Light brown fine to medium grain SAND. Moist. No apparent staining.
		E.O.B. @ 14'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-67
Prepared by Revin Phillips

Depth (ft)

Description



B1 01-11 Ma
Boring/Well No. 0-10
Boring/Well No. 0-10 Location Site 0
Owner IEPA
Ton of Inner Casing Play Wi
Drilling Firm Fox drilling Driller Kevin Phillips and Dan Sewall
Driller Kevin Bhilling and Dee County
Dilliar Marin Luillibs and Dan Sawell
Start & Completion Dates 2/26, 2/26/87
Type of Rig NA
Method of Drilling Hand auger
WELL DATA
well thin
Hole Diam. 4 in. Boring Depth 14 ft. Casing and Screen Diam.
Hole Diam. 4 in.
Boring Depth 14 ft.
Casing and Screen Diam.
Scieun interval
Screen Type
Stickup
Stickup Well Type
well type
well Construction:
Filter Pack
Seal Grout
Grout
LOCK NO.
TEST DATA
Static Water Elev Date
Static Water Elev Date
Slug Test Yes No
Test Date
Static Water Elev. Date Slug Test Yes No Test Date
Mydraulic Conductivity
Test Date Hydraulic Conductivity Other
Mydraulic Conductivity
Other
Mydraulic Conductivity
other QUALITY
Other
Other  WATER QUALITY  Samples Taken Yes No X  No. of Samples
Other  WATER QUALITY  Samples Taken Yes No X  No. of Samples
other QUALITY
Other  WATER QUALITY  Samples Taken Yes No X  No. of Samples
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
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Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Other  WATER QUALITY  Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled  Samplers  Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for
NATER QUALITY  Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled  Samplers Samples Analyzed for  Split Samples Yes X No  Recipient Geraghty & Miller for the
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15'
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15'
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty a Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' anelyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty a Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' anelyzed for HSL compounds.
Samples Taken Yes No X  No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty a Miller for the Village of Sauget  Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' anelyzed for HSL compounds.

Site Dead Creek Site-O	Boring/Well No. 0-9

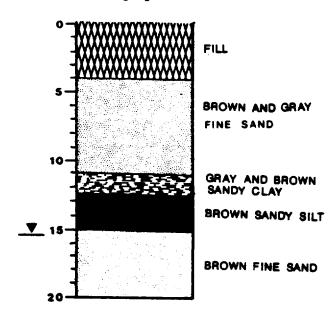
Sample Depth	Blow Count	Description
	Hand auger	0-1 Red-brown silty CLAY (fill-cap material).
1 - 2.5	Hand auger	FILL consisting of red-brown mottled silty CLAY. Trace of fine grain sand and roots. Moist.
3.5 - 5	Hand auger	3.5-4' FILL consisting of grayish-brown silty CLAY. Trace of fine grain SAND. Trace of black hardened material throughout.
		Fill discontinues # 4'.
		4-5' Brownish-gray very silty fine grain SAND. Some silt. Moist.
6 - 7.5	Hend auger	Loose grayish-brown very silty fine grain SAND. Thin reddish or black-gray staining in horizontal layers.
8.5 - 10	Hand auger	Firm grayish-brown very silty fine grain SAND. Similiar stain as seen in sample above. Very moist. Oily sheen.
11 - 12.5	Hand auger	Grayish-brown sandy silty CLAY. Some silt. Little fine grain sand. Oily sheen in very moist layers.
13.5 - 15	Hand auger	Brown very sandy SILT. Some fine grain sand. 2" fine grain sand layer 8 14.5" stained red-orange. Black-gray stained layers throughout.
16 - 17.5	Hand auger	Brown very silty fine grain SAND. Wet.
18.5 - 20	Hand auger	Same as above. Oily sheen in water.

E.O.B. @ 20'

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft)

Description



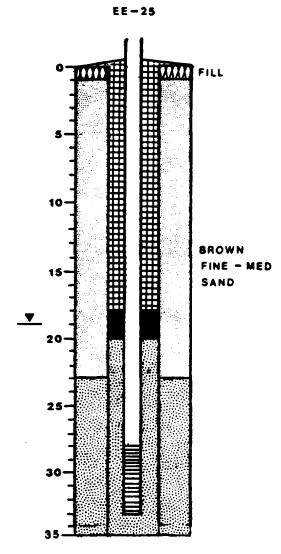
Boring/Well No. 0-9
Location Site O
Olman TERS
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Robby Crachy, Dan Sewall,
Kevin Philling
Start & Completion Dates 2/26, 2/26/87
Type of Rig KA
Method of Drilling Hand auger
Metuod of Difffind Wand andet
WELL DATA
Hole Diam. 4 in. Boring Depth 20.0 ft. Casing and Screen Diam.
Boring Depth 20.0 ft.
Casing and Screen Diam.
SCIAGU TUTALAST
Scien Type
Stickup
Well Type
Well Construction:
Piltor Pack
Seal
91000
Lock No.
TEST DATA
Static Water Elev. Date
Static Water Elev. Date Date
Slug Test Yes No
Test Date
Test Date Hydraulic Conductivity
Other
WATER QUALITY
Samples Taken Yes No X No. of Samples
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled
Samples Taken Yes No X  No. of Samples  Types of Samples  Date Sampled  Samplers  Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analysed for  Split Samples Yes X No
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analysed for  Split Samples Yes X No
Samples Taken Yes No X  No. of Samples  Types of Samples  Date Sampled  Samplers  Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15'
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15'
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.

	Dead	Crack	Site-O	
3114				

#### Boring/Well No. 0-8/Well #EE-25

Sample Depti	Blow Count	Description
		Crushed limestone surface.
		* Straight drill to 23.5
		Approximate stratigraphy based on auger cuttings.
		0.5'-1.0' Black silty CLAY. Fill.
		$\frac{1.0-20+'}{2}$ Brown fine grain SAND. Trace of silt. Water level while drilling ~19'.
23.5 - 25	11-16-15	Brown fine to medium grain SAND. Wet.
28.5 - 30	9-17-17	Brown-gray fine to medium SAND. Wet.
33.5 - 35	5-8-13	Brown medium grain SAND. Trace of coarse grain sand and small to medium gravel.
		E.O.B. @ 35'

Project Name	_Dead Creek
Project No.	IL 3140
Date Prepared	2-20-87
Prepared by	Tim Maley

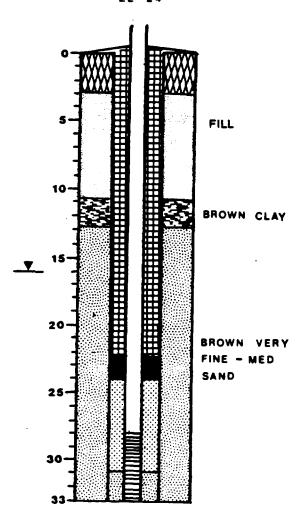


Boring/Well No. U-B/EE-25
Location Site O
Owner TEPA
Top of Inner Casing Elev. 411.25
Drilling Firm Fox drilling
Dilling biem Lox deliling
Driller Jerry Hammon Start & Completion Dates 2/20, 2/20/87
Start & Completion Dates 2/20, 2/20/87
Type of Rig Mobile B-61
Make 4 - 4 A - 1991 4 4 14 A A A
Method of Drilling 3 3/4" I.D.
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
WELL DATA
WOLLD DATA
Hole Diam. 8 in. Boring Depth 35 ft.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
casing and serven blan. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.72 ft. Well Type monitoring
Well Type monitoring
Well Construction:
MAIT COURCINCTION:
Filter Pack 33 - 20 ft. Natural
Seal 20 - 18 ft.
Filter Pack 33 - 20 ft. Natural Seal 20 - 18 ft. Grout 18 ft. to surface Lock No. 2834
Lock We 2434
DOCK NO
test data
# # # # # # # # # # # # # # # # # # #
Static Water Blev. 395.73 Date 3-26-87 Static Water Blev. 397.39 Date 5-11-87
Static Water Elev. 397.39 Date 5-11-87
Slug Test Yes X No
TOUT DATE 3-12-6/
Hydraulic Conductivity 16 x 10"3 cm/sec
whateniic conductivity is x in . cm/sec
Other pH =7.0
Other pH =7.0  Cond. = 1400 ushos Temp. = 56° F
Other pH =7.0  Cond. = 1400 umhos Temp. = 56° F  Cloudy, vellowish, slight odor
Other pH =7.0  Cond. = 1400 umhos Temp. = 56° F  Cloudy, yellowish, slight odor
Cloudy, yellowish, slight odor
Cond. = 1400 ushos Temp. = 56° P Cloudy, yellowish, slight odor WATER QUALITY
Other pH =7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY
Other pH =7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY
Other pH =7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY
Other pH =7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY
Cloudy, yellowish, slight odor
Other pH =7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater
Other pH = 7.0  Cond. = 1400 ushos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87
Other pH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Other pH = 7.0  Cond. = 1400 ushos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87
Other pH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Other pH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Other pH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E
Other pH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samples Analysed for HSL compounds
Other DH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the
Other DH = 7.0  Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments
Cond. = 1400 unhos Temp. = 56° F  Cloudy, yellowish, slight odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers Z & E  Samples Analysed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the  Village of Sauget  Comments

Sample Depth Blow Count		Description	
		Well vegetated clay cap.	
1 - 2.5	23-22-22	FILL consisting of black silty CLAY. Some crushed limestone, gravel, fine to coarse grain sand, and silt.	
		Fill discontinues @ 3'.	
3.5 - 5	6-9-11	Brownish-gray fine grain SAND. Trace of silt. Dry.	
6 - 7.5	4-4-4	Gray very fine grain SAND. Some silt. Dry.	
8.5 - 10	6-7-7	Brown fine to medium grain SAND. Dry.	
11 - 12.5	0-2-8	Brown-silty CLAY. Slightly mottled. Trace of fine grain sand. Moist.	
13.5 - 15	6-7-9	Gray very fine grain SAND. Very moist.	
16 - 17.5	7-8-10	Brown medium grain SAND. Trace of coarse grain sand and small to medium gravel. Wet.	
18.5 - 20	3-2-3	Same as above.	
21 - 22.5	3-4-13	Brown very fine grain SAND. Trace of silt. Wet.	
23.5 - 25	11-15-25	Brown medium grain SAND. Trace of clay @ 24'. Trace of coarse sand and small gravel. Wet.	
26 - 27.5	6-3-5	Same as above.	
28.5 - 30	NA	Gray medium grain SAND. Wet.	
		B.O.B. @ 33'	

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-19-67
Prepared by _	Tim Maley
·	

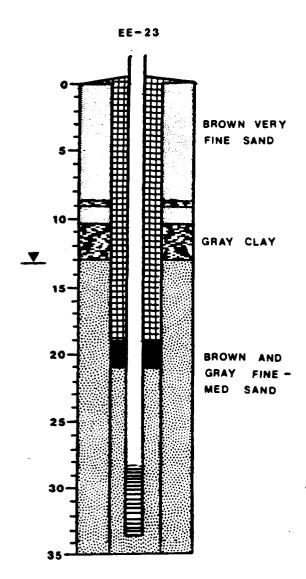
EE-24



Boring/Well No. 0-7/EE-24 Location Site 0
Owner IEPA Top of Inner Casing Elev. 411.00
Drilling Firm Pox drilling
Driller Jerry Hammon Start & Completion Dates 2/19 2/19/87
Driller Jerry Hammon Start & Completion Dates 2/19, 2/19/87 Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
hollow stem augers, Rotary
WELL DATA
Hole Diam. 8 in. Boring Depth 33.0 ft. Casing and Screen Diam. 2 in.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Interval 28 - 33 ft. Screen Type stainless steel 0.01" slot Stickup 0.98 ft.
Well Type Monitoring
Well Construction: Filter Pack 33 - 24 ft.
Seal 24 - 22.5 ft.
Filter Pack 33 - 24 ft.  Seal 24 - 22.5 ft.  Grout 22.5 ft. to surface  Lock No. 2834
LOCK NO
TEST DATA
Static Water Elev. 395.04 Date 3-26-87 Static Water Elev. 396.84 Date 5-11-87
Slug Test Yes X No
Slug Test Yes X No Test Date 5-12-87 Hydraulic Conductivity 0.65 x10 <sup>-3</sup> cm/sec
Hydraulic Conductivity 0.65 x103cm/sec
Other pH = 7.2  Cond. = 4200 umhos Temp. = 58° F  Very cloudy, yellowish, slight odor
Very cloudy, yellowish, slight odor
MATER QUALITY
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
No. of Samples 1 round
Date Sampled 3-24-87
Samples Analyzed for HSL compounds
Samples Analysed for HSL compounds
Samples Analyzed for HSL compounds
Split Samples Yes X No Recipient Geraghty & Miller for the
Split Samples Yes X No
Split Samples Yes X No Recipient Geraghty & Miller for the
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments
Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments

Sample Depth B	low Count	Description
1 - 2.5	1-2-1	Brown very fine grain SAND. Trace of silt. Dry.
3.5 - 5	1-2-1	Same as above.
6 - 7.5	2-3-2	Same as above. Increased amount of silt.
8.5 - 10	1-2-2	Same as above. Brown-gray silty CLAY layer # 8.5-9'.
11 - 12.5	1-1-2	Soft gray silty CLAY. Trace of very fine grain sand. Moist.
13.5 - 15	1-1-3	Brown fine to medium grain SAND. Wet.
16 - 17.5	2-6-10	Brown very fine grain SAND. Trace of silt. Wet. Two thin gray silty clay layers $(-1^n)$ @ 16 $3/4^r$ .
18.5 - 20	2-6-10	Brown fine to medium grain SAND. Wet.
21 - 22.5	8-3-14	Brown medium grain SAND. Trace of coarse grain sand and small gravel.
23.5 - 25	4-7-10	Same as above.
26 - 27.5	4-8-16	Gray fine to medium grain SAND. Trace of small gravel. Wet.
28.5 - 30	4-6-9	Same as above.
33.5 - 35	5-7-11	Same as above.
		E.O.B. @ 35'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-18-87
Prepared by _	Tim Maley



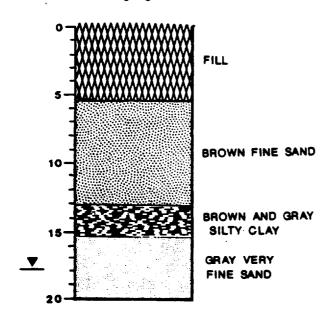
Boring/Well No. U-6/EE-23
Boring/Well No. 0-6/EE-23 Location Site 0
Owner IEPA
Top of Inner Casing Elev. 410.67
Drilling Firm Fox drilling
Driller Jerry Hammon Start & Completion Dates 2/18, 2/18/87
Start & Completion Dates 2/18, 2/18/87
Type of Rig Mobile B-61
Method of Crillian 1 1/4" T C
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
Hotto star adjets, Rotally
WELL DATA
Hole Diam. 8 in.  Boring Depth 35.0 ft.  Casing and Screen Diam. 2 in.  Screen Interval 28.5 - 33.5 ft.  Screen Type stainless steel 0.01" slot  Stickup 1.58 ft.  Well Type Monitoring
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28.5 - 33.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.58 ft.
Well Construction:
Filter Pack 33.5 - 21 Ft. Natural
Group 19 ft to surface
Filter Pack 33.5 - 21 ft. Natural Seal 21 - 19 ft. Grout 19 ft. to surface Lock No. 2834
2001 110.
TEST DATA
Static Water Elev. 395.95 Date 3-26-87   Static Water Elev. 397.77 Date 5-11-87   Static Water Elev. Yes   No X
Static Water Elev. $\frac{397.77}{100}$ Date $\frac{5-11-87}{100}$
Slug Test Yes No X
Test Date
HVdraulic Conductivity
Other pH = 7.0 Cond. = 1300 unhos Temp. = 56° P
Cloudy, yellowish green, slight odor
Cloudy, yellowish green, slight odor
WATER QUALITY
Samples Taken Yes X No
Samples Taken Yes X No
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
Samples Taken Yes X No
Types of Samplesgroundwater
Date Sampled 3-24-87
Date Sampled 3-24-87
Types of Samplesgroundwater
Date Sampled 3-24-87
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Date Sampled 3-24-87 Samplers E & E Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Hiller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.

site <u>Dead C</u>	rook Sito-	Boring/Well No. 0-5
Sample Depth Blow Count Description		
		Well Vegetated clay cap.
1 - 2.5	1-2-2	FILL consisting of soft brown silty CLAY.
3.5 - 5	1-1-1	Same as above.  Pill discontinues @ approx. 5.5'.
6 - 7.5	4-4-4	Brown very fine grain SAND. Some silt. Dry.
8.5 - 10	2-5-7	Brown fine grain SAND.
11 - 12.5	3-4-3	Same as above.
13.5 - 15	2-3-4	Brown-gray silty CLAY. Some interbedding of silty very fine grain sand.  Dry.
16 - 17.5	2-2-2	Gray very fine grain SAND. Trace of silt. Moist @ 17'.
18.5 - 20	3-6-8	Same as above. Wet.
		E.O.B. @ 20'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-17-87
Prepared by	Tim Maley
_	

Description

0 - 5



Boring/Well No.	0-5
Location Site	0
OUDAY TEDA	
Top of Inner Ca	sing Elev. NA
Drilling Firm	Fox drilling Hammon ion Dates 2/17, 2/17/
Driller Jerry	Wanner .
Start & Complet	ion Dates 2/17 2/17/
Type of Rig M	abile 8-61
Type of kig	00114 8-01
Makkad ad Barill	ing <u>3 3/4" I.D.</u>
hollow stem a	Ing <u>3 3/4 1.0.</u>
ROTION SCAN E	agers .
W	ELL DATA
Hole Diam. 8	1n. 20.0 ft.
Boring Depth	20.0 FE.
Casing and Scree	en Diem.
Screen Interval	
Screen Type	
Stickup	
Well Type	
Well Construction	on:
Filter Pack	
Seal	
Lock No.	
•	TEST DATA
Static Water Ele	ev. Date
Static Water Ele	ev. Date
Slug Test	YesNo_
Test Date	
Hydraulic Condu	ctivity
Other	
WAT	ER QUALITY
Samples Taken	Yes No_X
Samples Taken No. of Samples	
Types of Sample:	
Types of Sample.	
Samplers	
Samples Analyzed	d for
•	
Split Samples(sc	oil)Yes X No
	ighty & Miller for the
Village of Sau	
100044 00 380	
Comments Suhar	urface soil samples
from boring 1	.5 - 20' analyzed for
HSL compounds	
- non compositos	1
<del></del>	
Strong organic	REMARKS c odor
Strong organic	
Ground elev.	413.12
<del></del>	

•

Site Dead Cr	eek Site-O	Boring/Well No. 0-4
Sample Depth	Slow Count	Description
		Well vegetated clay cap.
1 - 2.5	1-2-2	FILL consisting of dense brown silty CLAY. Trace of fine grain sand.
3.5 - 5	6-3-4	Same as above to 4'.  4-5.5' Black clay-like sludge.
6 - 7.5	1-3-4	Dark greenish-gray very fine grain SAND. Trace of silt. Dry.
8.5 - 10	4-6-8	Dark brown very fine grain SAND. Trace of clay and silt in thin layers.
11 - 12.5	4-4-5	Light brown fine to medium grain SAND. Dry.
13.5 - 15	3-4-5	Brown very fine grain SAND. Trace of silt. Dry.
16 - 17.5	1-3-4	Brown-gray silty CLAY. Trace of very fine grain sand. Dry. Soft black silty clay layer 0 17 $1/4^{\circ}$ (-2")
18.5 - 20	6-6-7	Gray very fine grain SAND. Trace of silt and medium grain sand. Wet @ 20'.
		E.O.B. @ 20'

		<del></del>
Bundant Mana - Boad Coas	- <b>L</b>	n 1 m.11 m. n 4
Project Name Dead Cree Project No. IL 3140	PK	Boring/Well No. 0-4
Project NoIL 3140	<del></del>	Location Site O
Date Prepared 2-17-87		Owner IEPA
Prepared by Tim Maley	·	Top of Inner Casing Elev. NA
		Drilling Firm Fox drilling
Depth (ft)	Description	Driller Jerry Hammon
		Start & Completion Dates 2/17, 2/17/8
_		Type of Rig Mobile B-61
0-4		<del> </del>
		Method of Drilling 3 3/4" I.D.
0 -444444444	\AAAAM	hollow stem augers
- <b>XXXXXXXXXXXXX</b>	XXXXXI	
	WWW FILL	WELL DATA
TKXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XXXXXI	
7,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(XXXXXII	Hole Diam. 8 in.
-0.000	17777	Boring Depth 20.0 ft.
5	BLACK SANDY CLAY	Casing and Screen Diam.
	888888	Screen Interval
		Screen Type
		Stickup
	A000000	Well Type
		Well Construction:
10-	DARK GRAY AND	Filter Pack
4	DARK GRAY AND	Seal
_	BROWN FINE SAND	Grout
	DIOWN FINE SAND	Lock No.
15-		TEST DATA
		Static Mater Play Date
	BROWN AND GRAY	Static Water Elev Date
2.62.33	SILTY CLAY	Slug Test Yes No No
		Test Date
	GRAY VERY FINE SAND	Hydraulic Conductivity
20-	المنتب	Other
		WATER QUALITY
		Samples Taken Yes No_X
		No. of Samples
		Types of Samples
		Date Sampled
		Samplers
		Samples Analysed for
		Split Samples(soil)Yes_X No
		Recipient Geraghty & Miller for the
		Village of Sauget
		Comments Subsurface soil samples
		from boring 0 - 10'analysed for
		HSL compounds.
		remarks
		Strong organic odor
		Ground elev. 412.62
		Ground Glev. 412.52

Site	Dead Creek Site-O	<del></del>	Boring/Well No.	 0-3	

#### Sample Depth Blow Count

		Well vegetated clay cap.
- 2	5-5-7	FILL consisting of dense brown silty CLAY. Trace of very fine grain sand.
.5 - 5	2-1-2	Same as above.
- 7.5	1-2-2	Same to 6.5' 6.5-8' Black sponge-like substance. Sludge. Pill discontinues @ approx. 8'.
.5 - 10	3-6-7	Brown very fine grain SAND. Trace of silt. Dry.
1 - 12.5	3-2-3	Same as above.
3.5 - 15	3-2-3	Brown silty CLAY. Trace of very fine grain sand. Slightly mottled. Noist.
6 - 17.5	3-5-8	Brown silty very fine grain SAND. Dry.
8.5 - 20	7-7-7	Brown very fine grain SAND. Wet @ 20'.
		E.O.B. @ 20'

 Project Name
 Dead Creek

 Project No.
 IL 3140

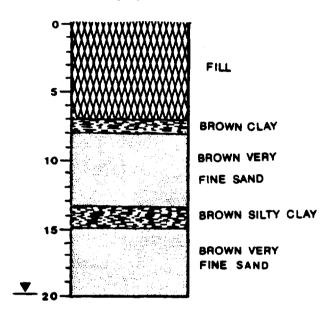
 Date Prepared
 2-17-87

 Prepared by
 Tim Maley

Depth (ft)

Description

0-3



Boring/Well No. 0-3
Location Site O
200201011 3104 0
Owner IEPA Top of Inner Casing Elev. NA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 2/17, 2/17/87
Diffing title tox diffing
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Big Mobile 8-61
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D. hollow stem augers
Method of Drilling 3 3/4" I.D.
hallow step suggest
hollow stem augers
WELL DATA
m = -1
Hole Diam. 8 in. Boring Depth 20.0 ft.
Boring Depth 20.0 ft.
Casing and Screen Diam.
casing and selven blas.
Screen Interval
Screen Type
0.1.1
Stickup Well Type
Well Type
Well Construction:
mes wilderwessyll
Filter Pack
Seal
Seal
91091
Lock No.
TEST DATA
Inc. min
Static Water Elev. Date
Shabia Mahar Elau
Static water Blev Date
Slug Test Yes No
Static Water Elev. Date Static Water Elev. Date Slug Test Yes No Test Date
Dud-ould a Goodin Admids
Hydraulic Conductivity
Hydraulic Conductivity
Other
Other
Other
Other
Other WATER QUALITY
WATER QUALITY
WATER QUALITY
WATER QUALITY
Samples Taken Yes No X
Samples Taken Yes No X
WATER QUALITY
Samples Taken Yes No X
WATER QUALITY  Samples Taken Yes No X  No. of Samples  Types of Samples
WATER QUALITY  Samples Taken Yes No X  No. of Samples  Types of Samples
MATER QUALITY  Samples Taken Yes No X  No. of Samples  Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers
MATER QUALITY  Samples Taken Yes No X  No. of Samples  Types of Samples  Date Sampled
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers
MATER QUALITY  Samples Taken Yes No X  No. of Samples  Types of Samples  Date Sampled  Samplers  Samples Analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Sampler Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty E Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.
Samples Taken Yes No X No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples(soil)Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

•

Sample Depth	Blow Coun	Description
		Well vegetated clay cap.
1 - 2.5	2-4-8	FILL consisting of brown silty CLAY. Trace of very fine grain sand.
3.5 - 5	3-5-6	Same as above.
6 - 7.5	2-2-2	Soft black silty CLAY. Black sponge-like substance @ 7.5' ( .5')
		Fill discontinues @ approx. 8'.
8.5 - 10	3-5-7	Brown sandy SILT. Trace of fine grain sand. Dry.
11 - 12.5	3-5-7	Brown fine grain SAND. Dry.
13.5 - 15	1-1-1	Soft brown-gray silty CLAY. Trace of very fine grain sand. Moist.
16 - 17.5	3-6-6	Brown very fine grain SAND. Dry.
18.5 - 20	2-3-3	Brown-gray silty CLAY: mottled. Trace of very fine grain sand. Moist.
21 - 22.5	1-1-8	Gray fine grain SAND. Wet.
23.5 - 25	7-19-25	Same as above.
26 - 27.5	6-9-29	Same as above.
28.5 - 30	5-10-11	Same as above.
33.5 - 35	6-8-12	Same as above: oily sheen @ 34'
		E.O.B. # 35'

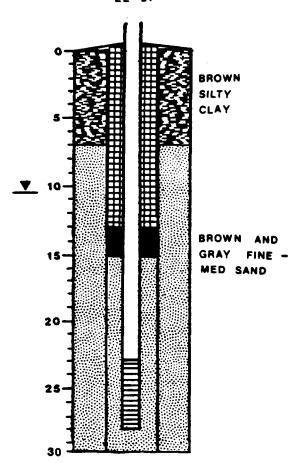
Project Name Dead Cree	)k	Boring/Well NoO-2/EE-22
Project No. IL 3140	<del></del>	Location Site 0
Date Prepared 1-17-87 Prepared by Tim Haley		Owner IEPA
Prepared by	<del></del>	Top of Inner Casing Elev. 416.26 Drilling Firm Fox drilling
Depth (ft)	Description	Driller Jerry Hammon
		Start & Completion Dates 1/17, 1/17/87
EE-22		Type of Rig Mobile B-61
1 1		Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
0-0000	Firm :	WELL DATA
-XXXXXIIII III	CXXXXI	Hole Diam. 8 in.
-WWE E	KXXXII	Boring Depth 35 ft.
- <b>!</b> /////###	MYYM	Casing and Screen Diam. 2 in.
	XXXX FILL	Screen Interval 28 - 33 ft.
5- <b> </b>	KXXXXII	Screen Type stainless steel 0.01" slot Stickup 1.54 ft.
1WWE ##	<b>/////</b>	Well Type monitoring
<u> </u>	<u> </u>	Well Construction:
		Filter Pack 33 - 24 ft. Natural
10-	BROWN SILT	Seal 24 - 22 ft. Grout 22 ft. to surface
		Lock No. 2834
	BROWN FINE SAND	
		TEST DATA
	BROWN AND	Static Water Elev. 394.98 Date 3-26-87
15-23-	GRAY CLAY	Static Water Elev. 396.57 Date 5-11-87
		Slug Test Yes No X
	BROWN VERY FINE SAND	Test Date Hydraulic Conductivity
185HI HI	BROWN AND GRAY	Other pH = 69
	CLAY	Cond. = 3600 umhos Temp. = 56° F
▼ <sup>20</sup> T S H H		Strong odor, cloudy, dark brown
		WATER QUALITY
		and a second
		Samples Taken Yes X No. No. of Samples 1 round
25-	GRAY FINE SAND	Types of Samples groundwater
	GRAT FINE SAND	
] []		Date Sampled 3-24-87
	*4	Samplers E & E
30-	****	Samples Analyzed for HSL compounds
4   1		
- 1		
4 1 4	e v	Split Samples Yes X No
	Maria de la Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Maria de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Carlo de Ca	Recipient Geraghty & Miller for the
35	<del></del>	Village of Sauget
		Comments Subsurface soil samples
		from boring 20 - 30' analyzed for
		HSL compounds.
		REMARES

Sample Depth	Blow Count	Description
		Grassy field on surface
1 - 2.5	4-5-4	Brown silty CLAY. Trace of very fine grain sand. Dry.
3.5 - 5	1-2-2	Same as above.
6 - 7.5	1-1-3	Same as above.
8.5 - 10	3-3-6	Brown fine grain SAND. Trace of silt. Dry.
11 - 12.5	5-5-6	Same as above. Trace of medium grain sand. Moist.
13.5 - 15	1-3-5	Brown medium grain SAND. Trace of coarse grain sand. Wet. Thin gray silty clay layer at $14^{\prime}$ ( $2^{\prime\prime}$ )
16 - 17.5	1-3-6	Gray fine grain SAND. Wet. Trace of thin gray silty clay layers at $16.5'$ ( $1"$ )
18.5 - 20	1-5-5	Gray medium grain SAND. Trace of coarse grain sand and small to large gravel. Wet.
21 - 22.5	7-7-6	Same as above.
23.5 - 25	4-5-7	Same as above.
28.5 - 30	5-3-3	Same as above.
		E.O.B. @ 30'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-16-87
Prepared by	Tim Haley

Description

EE-21



Boring/Well No. 0-1/EE-21
Location Site O
Owner IEPA
Top of Inner Casing Elev. 407.41 Drilling Firm Fox drilling
Drillar Terry Mannen
Driller Jerry Hammon Start & Completion Dates 2/16, 2/16/87
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
WOLLD CALLA
Hole Diam. 8 in.
Boring Donth 30 ft
Casing and Screen Diam. 2 in.
Screen Type stainless steel 0.01" slot
Stickup 1.13 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 15 ft. Natural
Filter Pack 28 - 15 ft. Natural Seal 15 - 13 ft.
Grout 13 ft. to surface Lock No. 2834
Lock No. 2834
TEST DATA
Static Water Elev. $395.77$ Date $3-26-87$ Static Water Elev. $397.56$ Date $5-11-87$
Static Water Elev. 397.56 Date 5-11-87
Slug Test Yes X No Test Date 5-12-87  Hydraulic Conductivity 2.3 x 10 cm/sec
Mudraulic Conductivity 2 % v 103cm/sec
MAGERATIC CONSECUTATION TO A TO ACENDED
Other DH = 6.8
Cond. = 1800 unhos Temp. = 58° F
Other pH = 6.8  Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish
Cond. = 1800 unhos Temp. = 58° F Cloudy, yellowish
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E 4 E  Samples Analyzed for HSL compounds
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samples Analyzed for HSL compounds  Split Samples Yes X No
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round  Types of Samples groundwater  Date Sampled 3-24-87  Samplers E 4 E  Samples Analyzed for HSL compounds
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed
Cond. = 1800 unhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.
Cond. = 1800 umhos Temp. = 58° F  Cloudy, yellowish  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater  Date Sampled 3-24-87  Samplers E & E  Samples Analyzed for HSL compounds  Split Samples Yes X No Recipient Geraghty & Miller for the Village of Sauget  Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.

Site Dead Creek Site-	-#
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	Boring/Well	Ho.	N-2
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Sample Depth	Blow Count	Description
		0-1 Crushed limestone fill
2.5	9-10-12	1-2 Crushed lime fill
		2-2.5 FILL consisting of loose dark gray very sandy SILT. Some fine
		grain sand. Trace of organic material (wood & roots).
.5 - 5	W	No recovery - possible rubber tire
7.5	ĸ	No recovery - possible concrete
1.5 - 10	47-6-2	FILL consisting of dark gray silty clay with concrete material and
		gravel. Fill discontinues @ approx. 10'.
1 - 12.5	6-10-9	Firm dark gray very sandy SILT. Some very fine grain sand. Trace of
		organic material (wood and roots). Black streaks. Wet.
.3.5 - 15	3-4-4	Firm gray fine to medium grain SAND. Trace of small to medium gravel.
		Wet. Sand is rounded to sub angular and fairly well to poorly sorted.
6 - 17.5	7-11-12	Gray fine to medium grain SAND. Trace of small gravel. Wet.
.8.5 - 20	8-12-14	Dense brown fine to medium grain SAND. Well sorted. Wet.
21 - 22.5	9-13-15	Same as above.
23.5 - 25	9-11-15	Dense gray fine to medium SAND. Trace of coarse grain sand and small
		gravel. Wet.
26 - 27.5	8-12-13	Dense gray fine to coarse grain SAND. Trace of small gravel. Wet.
18.5 - 30	9-14-23	Same as above.
11 - 32.5	7-9-11	Dense gray very fine grain SAND. Wet.
3.5 - 35	6-8-10	Same as above. Darker gray.
16 - 37.5	12-17-23	Very dense. Gray fine to coarse grain SAND. Wet.
18.5 - 40	8-9-13	Same as above.
.5 - 10	9-9-14	JERY TO GAVIE.
ļ	1	E.O.B. @ 40'

	<del></del>		
Project Name _			Boring/Well No. N-2
Project No			Location Site N
Date Prepared			Owner IEPA
Prepared by	levin Phillips		Top of Inner Casing Elev. NA
Donah (da)	Descripti	lan	Drilling Firm Fox drilling
Depth (It)	Descripe	Lon	Driller Jerry Hammon Start & Completion Dates12/15,12/15/86
			Type of Rig Mobile 8-61
	N - 2		1180 01 414 -1100110 -11
			Method of Drilling 3 3/4" I.D. hollow
~	VVVVVVVVVVVV		stem augers and rotary
JWK.	**************************************		
J.W.	<b>*************************************</b>		WELL DATA
<b>3</b> WM	<b>/////////////////////////////////////</b>		
7///	<b>YYYYYYYYYY</b>		Hole Diam. 8 in.
_ TXXX)	. האאאאאאאא	FILL	Boring Depth 40.0 ft. Casing and Screen Diam.
3 <b>- T</b> XXXX	. <b>I</b> kkkkkkkkkkkkk	146	Screen Interval
1000			Screen Type
1	***************************************		Stickup
1888	WWW.WW.		well Type
1000	<b>^</b>		Well Construction:
10-	AAAAAAAAAA		Filter Pack
▼ 1		DARK GRAY SANDY SILT	Seal
	•	DANK GHAT SANDT SIEL	Grout Lock No.
- decrea	REFERENCE CONTROL OF C		DOCK NO.
			TEST DATA
15-			
		•	Static Water Elev Date Static Water Elev Date
			Slug Test Yes No
			Hydraulic Conductivity
20-			Other
		<b>65</b> 44	
		GRAY	WATER QUALITY
			MATTER ANNTELLS
25-		FINE - MED SAND	Samples Taken Yes No_X
-			No. of Samples
-			Types of Samples
1			
-			
30			Date Sampled
			Samples Analysed for
-			
4			
-			
35-			Split Samples Yes No X
-			Recipient
-			Companie Bubsurface soil complet
4			from boring 5 - 15' analyzed for
-			HSL compounds.
40			
			REMARKS
			<del></del>

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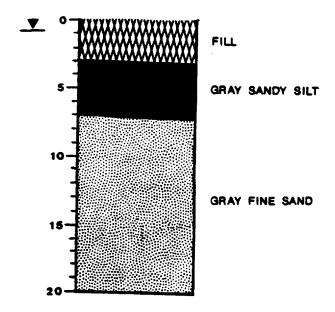
site	Dead Creek Site-H	Boring/Well Bo. N-1	
			_

Sample Depth	Blow Coun	t Description
1 - 2.5	4-6-10	0-2.5 FILL consisting of crushed limestone, gravel, and fine to coarse grain sand. Wet.
		Fill discontinues # 3'.
3.5 - 5	3-9-9	$\frac{3.5-4}{4-5}$ Stiff gray very sandy SILT. Some fine grain sand. Wet.
6 - 7.5	2-4-3	6-7 Loose gray very sandy SILT. Some fine grain sand. Black and reddish staining throughout. Wet.
		7-7.5 Loose brownish gray fine to medium grain SAND. Some reddish staining. Wet.
8.5 - 10	2-4-7	Loose gray sandy SILT. Some fine grain sand. Trace of organic material (wood, etc.). Stained black. Wet.
11 - 12.5	1-2-5	Loose brown very silty fine grain SAND. Some silt. Black stained layer at $12^{\prime\prime}~(-1^{\prime\prime\prime})$
13.5 - 15	1-3-3	Same as above.
16 - 17.5	2-5-7	Firm gray silty fine grain SAND. Trace of small to medium gravel. Wet.
18.5 - 20	2-3-7	Firm gray fine grain SAND. Wet.
`		E.O.B. @ 20'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	12-15-86
Prepared by	Kevin Phillips

Description

N - 1



Boring/Well No. N-1
Location Site N
A
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 12/15,12/15/86
Driller Jerry Hammon
Start & Completion Dates 12/15,12/15/86
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 20.0 ft.
Boring Depth 20.0 ft.
Screen Interval
screen lype
Stickup
MATT TABLE
Well Construction:
Pilter Pack
2441
41.446
Lock No.
TEST DATA
Static Water Elev. Date Static Water Elev. Date Slug Test Yes No Test Date Hydraulic Conductivity
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other
WATER QUALITY
Samples Taken Yes No X
Samples Taken YesNo_X No. of Samples
Samples Taken Yes No X No. of Samples Types of Samples
Samples Taken Yes No X No. of Samples Types of Samples
Types of Samples
Types of Samples
Types of Samples
Types of Samples
Types of Samples
Types of Samples  Date Sampled  Samplers  Samples Analyzed for
Pages of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X
Pages of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X
Cate Samples  Coate Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X  Recipient
Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X  Recipient
Types of Samples  Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X  Recipient  Comments Subsurface soil samples  from boring 0 - 10' analyzed for
Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X  Recipient
Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X  Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.
Types of Samples  Types of Samples  Date Sampled  Samplers  Samples Analyzed for  Split Samples Yes No X  Recipient  Comments Subsurface soil samples  from boring 0 - 10' analyzed for
Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.
Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.
Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.
Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.
Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.
Types of Samples  Date Sampled Samplers Samples Analyzed for  Split Samples Yes No X Recipient  Comments Subsurface soil samples from boring 0 - 10' analyzed for  HSL compounds.

Site I	bsec	Crook	Sit	e-L	

Boring/Well No. L-4/Well + EE-G109

Description

(IEPA Replacement Well)

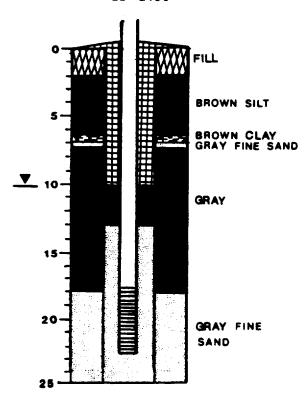
Sample Depth	Blow Coun	t		
		0-2'	PILL	consisti

		0-2' FILL consisting of black asphalt and clay.
1 - 2.5	5-6-7	from 2' Brown sandy SILT. Moist.
3.5 - 5	3-3-4	Brown sandy SILT. Trace of medium grain sand.
5 - 7.5	3-4-4	6.5-7 Brown silty CLAY. Trace of fine grain sand.
		7-7.5 Gray fine grain SAND. Trace of silt and clay.
3.5 - 10	3-4-6	Brown-gray (mottled) clayey SILT. Trace of fine grain sand. Moist.
11 - 12.5	4-7-8	Gray sandy SILT. Wet.
3.5 - 15	6-11-13	Same as above. Trace of fine grain sand.
16 - 17.5	8-14-34	Stiff gray sandy SILT. Thin laminated black-gray layering.
18.5 - 20	8-13-15	Gray fine grain SAND. Wet.
21 - 22.5	9-12-17	Same as above.
13.5 - 25	7-14-18	Dark gray fine to coarse grain SAND. Some black staining. Wet.
•		E.O.B. @ 25'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	12-16-86
Prepared by	Tim Haley
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Description

EE-G109



Boring/Well No. L-4/EE-Gl09 Location Site L Owner IEFA Top of Inner Casing Elev. 409.71 Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Datesi2/16,12/16/1 Type of Rig Mobile B-61  Method of Drilling 3 3/4" I.D. hollow stem augers  WELL DATA  Hole Diam. 8 in. Boring Depth 25.0 ft. Casing and Screen Diam. 2 in. Screen Interval 17.5 - 22.5 ft. Screen Type stainless steel 0.01" slc Stickup 1.94 ft. Well Type monitoring Well Construction: Filter Pack 25 - 13 ft. Seal 13 - 10 ft. Grout 10 ft. to surface Lock No. 2834  TEST DATA  Static Water Elev. 397.42 Date 3-26-8 Static Water Elev. 398.45 Date 5-11-8 Slug Test Yes No X Test Date Hydraulic Conductivity Other pH = 5.0  Cond. = 4500 umhos Temp. = 58° F Cloudy, dark, strong odor  WATER QUALITY  Samples Taken Yes X No No. of Samples 1 round Types of Samples 1 round Types of Samples 2 groundwater  Date Sampled 3-24-87 Samples Analyzed for HSL compounds, volatile organics  REHARRS  REHARRS	(IEPA well replace	ed)
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REMARES		
	REMARKS	

Site <u>Dead</u>	Creek Site-	Boring/Well No. L-3
Sample Dep	th Blow Cour	nt Description
		0-1 Black cinders FILL
1 - 2.5	6-7-9	FILL consisting of stiff brown-gray silty CLAY. Trace of fine grain sand, small gravel, and brick fragments. Moist.
3.5 - 5	5-5-6	FILL consisting of stiff gray silty CLAY. Little small gravel; trace of fine grain sand, large gravel, brick fragments, and wood chips. Moist.

Fill apparently discontinues # spprox. 6'.

6-6.5 Loose dark gray SILT. Stained black.

6.5-7.5 Loose brownish gray very sandy SILT. Some fine grain sand.

Firm black-gray sandy SILT. Some fine grain sand. Little clay. Moist.

.5 - 10 3-4-6 Pirm, gray clayey SILT. Some brownish staining. Trace of fine grain sand. Moist. Mottled.

11 - 12.5 3-3-5 Firm black clayey SILT. Some clay. Little fine grain sand. Very moist.

16 - 17.5 2-5-10 16-17 Same as above. Wet. 17-17.5 Black silty SAND. Wet.

2-2-3

3-3-5

13.5 - 15

18.5 - 20 | 1-2-4 | Firm black fine grain SAND. Well sorted. Wet.

E.O.B. @ 20'

Project NameD	ead Creek	_	Boring/Well No. L-3
Project No. IL	, 3140		Location Site L
Date Prepared Prepared by Ke	12-12-60	_	Owner IEPA Top of Inner Casing Elev. NA
,,,ohered ol	7.42.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2	_	Drilling Firm Fox drilling
Depth (ft)	Description		Driller Jerry Hammon
•	• •		Start & Completion Dates12/12,12/12/86
			Type of Rig Mobile B-61
	L - 3		Method of Drilling 3 3/4" I.D.
<b>^-</b>			hollow stem augers
1	<b>*************************************</b>		WELL DATA
-10000	YXXXXXXXXXXI FILL		Hole Diam 8 in.
-1XXXX	XXXXXXXXXXXXXX		Boring Depth 20.0 ft.
5 <b>—</b>	***************************************		Casing and Screen Diam.
-1444	****		Screen Interval
-			Screen Type Stickup
-			Well Type
-			Well Construction:
10-			Filter Pack
*	GRAY	AND BLACK SILT	Seal
-			Lock No.
_			TEST DATA
15-			Static Water Elev Date
			Static Water Elev Date
]			Slug Test Yes No No Test Date
	BLAC	K FINE SAND	Test Date Hydraulic Conductivity
20			Hydraulic Conductivity
••			Other
			WATER QUALITY
			Samples Taken Yes No_X
			No. of Samples
			Types of Samples
			Date Sampled
			SamplersSamples Analysed for
			Split Samples Yes No X Recipient
			Comments Subsurface soil samples
			from boring 0 - 20' analyzed for
			HSL compounds.
			REMARKS Strong organic odor
			serond ordente ador
			Ground elev. 407.90

Site Dead Cr	eek Site-L	Boring/Well No. L-2
Sample Depth	Blow Coun	Description
		0-1 Fill on surface - black cinders.
1 - 2.5	4-12-60	FILL consisting of black silty CLAY. Trace of smell gravel and concrete fragments. Moist.
3.5 - 5	8-5-7	FILL consisting of hard dark gray silty CLAY. Trace of small gravel, brick fragments, and wood chips.
6 - 7.5	2-4-8	FILL consisting of black-gray silty CLAY. Trace of small gravel and wood chips. Very moist. Stained black.
		Fill discontinues # 8'.
8.5 - 10	2-2-3	Soft gray very sandy SILT. Some fine grain sand. Very moist. Black staining throughout.
11 - 12.5	6-7-14	Same as above.
13.5 - 15	4-8-9	Loose black sandy SILT. Some fine grain sand. Very moist.
16 - 17.5	2-2-3	Loose black fine grain SAND. Wet.
18.5 - 20	2-3-6	Same as above. Trace of silt. Wet:
		E.O.B. @ 20'.

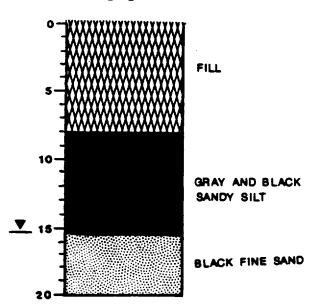
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Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-12-86
Prepared by Revin Phillips

Depth (ft)

Description

L - 2

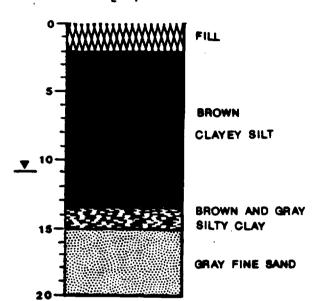


Boring/Well No. L-2 Location Site L Owner IEPA Top of Inner Casing Elev. MA Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates12/12,12/12/8 Type of Rig Mobile 8-61  Method of Drilling 3 3/4" I.D. hollow stem augers
Top of Inner Casing Elev. MA  Drilling Firm Fox drilling  Driller Jerry Hammon  Start & Completion Detes12/12,12/12/8  Type of Rig Mobile B-61  Method of Drilling 3 3/4" I.D.
Top of Inner Casing Elev. HA  Drilling Firm Fox drilling  Driller Jerry Hammon  Start & Completion Detes12/12,12/12/8  Type of Rig Mobile 8-61  Method of Drilling 3 3/4" I.D.
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates12/12,12/12/2 Type of Rig Mobile 8-61  Method of Drilling 3 3/4" I.D.
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates12/12,12/12/2 Type of Rig Mobile 8-61  Method of Drilling 3 3/4" I.D.
Method of Drilling 3 3/4" I.D.
Method of Drilling 3 3/4" I.D.
Method of Drilling 3 3/4" I.D.
Method of Drilling 3 3/4" I.D.
Method of Drilling 3 3/4" I.D. hollow stem augers
hollow stem augers
<del></del>
WELL DATA
Hole Diam. 8 in. Boring Depth 20.0 ft. Casing and Screen Diam.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup Well Type Well Construction:
Well Type
Well Construction:
Filter Pack
Seal
Seal Grout
Lock No.
TEST DATA
Static Water Elev Date
Static Water Elev Date
Static Water Elev. Date Slug Test Yes No Test Date
Test Date
Test Date Hydraulic Conductivity
Other
WATER QUALITY
Samples Taken Yes No X No. of Samples Types of Samples
No. of Samples
Types of Samples
Date Sampled
Samplers Samples Analyzed for
Sempres Adelyted tot
Split Samples Yes No X
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Recipient
Recipient
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for
Recipient
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.  REMARES
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.  REMARKS Strong organic odor
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.  REMARKS Strong organic odor
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.  REMARES
Recipient  Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.  REMARKS Strong organic odor

Site Dead C	reek Site-	Boring/Well Bo. L-1
Sample Dept	h Blow Cour	nt Description
1 - 2.5	4-6-7	0-2 FILL consisting of black sendy clay with asphalt, cinders, and gravel.
		Fill discontinues @ approx. 2'.
		2-2.5 Brown silty CLAY. Some small gravel. Moist.
3.5 - 5	4-4-3	Brown clayey SILT. Little fine grain sand. Moist.
6 - 7.5	3-3-6	Same as above.
8.5 - 10	2-2-2	Same as above. Very moist.
11 - 12.5	2-1-1	Soft gray clayey SILT. Little fine grain sand. Wet.
13.5 - 15	1-1-1	Soft brownish-gray very silty CLAY. Trace of fine grain sand.  Occasional thin seams of gray clayey silt. Moist.
16 - 17.5	WOR	Loose gray fine grain SAND. Wet.
18.5 - 20	5-5-7	Same as above. Wet.
		E.O.B. @ 20'

Dead Creek
IL 3140
12-11-86
Revin Phillips

Depth (ft) Description



BOLLING/ WELL NO	
Location Site 7	
	L-1
Top of Toper Carl	ng Elev. NA
Drilling Firm	or drilling
Driller larre H	ox drilling ammon n Dates 12/11,12/11,
Search & Complete	D Date = 1 2 / 1 1 2 / 1 1
arate a combinetto	ile B-61
Wathad of Drillin	g 3 3/4" I.D.
hollow stem and	y _ 3 3/4 1.U.
HOTIOA BEAM BIG	ers
	L DATA
Hole Diam. 8 in	.0 ft.
Boring Depth 20	.0 ft.
Casing and Screen	Diam.
Screen Interval	
acreen tabe	
Stickup	
Well Type	
Well Construction	:
Filter Pack	
5041	
41041	
1	
75	ST DATA
Static Water Elev	. Date
Static Water Elev	Date
Slug Test	Yes Date No_
Test Date	
<b>Hydraulic Conduct</b>	ivity
Hydraulic Conduct Other	ivity
Hydraulic Conduct Other	ivity
Hydraulic Conduct Other	ivity
Other	QUALITY
Other	QUALITY
WATER Samples Taken No. of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples Types of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples Types of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples Types of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples Types of Samples	QUALITY YesNo_X
WATER Samples Taken No. of Samples Types of Samples	QUALITY YesNo_X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed	QUALITY Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed	QUALITY YesNo_X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed	QUALITY Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed Split Samples Recipient	QUALITY Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed  Split Samples Recipient Comments Subsur	QUALITY Yes No X  for No X  face soil samples
Samples Taken No. of Samples Types of Samples Types of Samples Samplers Samplers Samplers Samples Analyzed  Comments Subsur from boring 5 -	QUALITY Yes No X
Samples Taken No. of Samples Types of Samples Samples Samples Samples Analyzed Split Samples Recipient Comments Subsur	QUALITY Yes No X  for No X  face soil samples
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samplers Analyzed  Split Samples Recipient Comments Subsur from boring 5 - HSL compounds.	QUALITY Yes No X  for No X  face soil samples 10' analysed for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsur from boring 5 - HSL compounds.	QUALITY Yes No X  for No X  face soil samples 10' analyzed for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samplers Analyzed  Split Samples Recipient Comments Subsur from boring 5 - HSL compounds.	QUALITY Yes No X  for No X  face soil samples 10' analyzed for
Samples Taken No. of Samples Types of Samples Types of Samples Samplers Samplers Samples Analysed  Split Samples Recipient Comments Subsur from boring 5 - HSL compounds.	QUALITY Yes No X  for No X  face soil samples 10' analyzed for
Samples Taken No. of Samples Types of Samples Types of Samples Samplers Samplers Samples Analysed  Split Samples Recipient Comments Subsur from boring 5 - HSL compounds.	QUALITY Yes No X  for No X  face soil samples 10' analyzed for
Samples Taken No. of Samples Types of Samples Types of Samples Samplers Samples Analysed  Split Samples Recipient Comments Subsur from boring 5 - HSL compounds.	QUALITY Yes No X  for No X  face soil samples 10' analyzed for

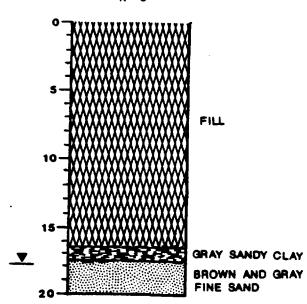
Site Dead Creek Site-K		Boring/Well Ho. K-3
Sample Depti	h Blow Count	Description
1 - 2.5	6-7-12	FILL consisting of brown-black silty CLAY. Some small gravel and crushed limestone fragments.
3.5 - 5	6-7-9	FILL consisting of black sandy CLAY with small gravel, slag material, asphalt, and cinders.
6 - 7.5	1-1-1	FILL consisting of black clayey SAND. Trace of small gravel. Wet.
6.5 - 10	1-2-1	Same as above.
11 - 12.5	1-2-2	No recovery.
13.5 - 15	4-10-5	FILL consisting of soft black silty CLAY. Trace of fine to medium grain sand, small gravel, and limestone fragments. Wet.
		Fill discontinues # approx. 16.5'.
16 - 17.5	2-3-6	Gray sandy CLAY. Very moist.

18.5 - 20 1-3-4 Brown-gray fine grain SAND. Wet. E.O.B. # 20'

rt NameDead Creek	Project Name
rt No. IL 3140	Project No.
Prepared 1-22-87	Date Prepared
red by Tim Maley	Prepared by
red by Tim Maley	Prepared by _

Description

K - 3

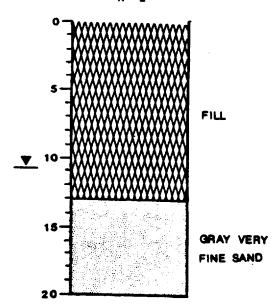


Boring/Well No.	K-3
Location Site	K
Auman TEDA	
Top of Inner Cas	ing Elev. NA
Drilling Firm	Fox drilling
Driller Jerry	Hammon
Start & Completi	Hammon
Type of Rig Mo	bile B-61
Method of Drilli	ng <u>3 3/4" I.D.</u>
hollow stem au	igers
	ELL DATA
Hole Diam. B i	0.0 ft.
Boring Depth	0.0 ft.
Screen Interval	
acteen type	
Stickup Well Type	
Well Type	
Well Construction	n:
LITTEL BECK	
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Grout	
Lock No.	
	TEST DATA
Static Water Ele	v Date v Date
Static Water Ele	v. Date
Slug Test	YesNo
Hydraulic Conduc	tivity
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Other	
Other	
	ER QUALITY
WATE	ER QUALITY
WATE	ER QUALITY
WATE Samples Taken No. of Samples	TR QUALITY Yes No X
WATE Samples Taken No. of Samples	ER QUALITY
WATE Samples Taken No. of Samples	TR QUALITY Yes No X
Samples Taken No. of Samples Types of Samples	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed	Tes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samplers Analysed Split Samples	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed  Split Samples Recipient	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed  Split Samples Recipient	Yes No X
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed  Split Samples Recipient	Yes No X
Samples Taken No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed  Split Samples Recipient Comments Subsufrom boring 10	for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed  Split Samples Recipient	for
Samples Taken No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed  Split Samples Recipient Comments Subsufrom boring 10	for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsu from boring 10 HSL compounds.	for
Samples Taken No. of Samples Types of Samples  Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsu from boring 10  HSL compounds.	for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsu from boring 10 HSL compounds.	Tes No X  Tes No X  Tes No X  Tes Soil samples  - 20' analyzed for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsu from boring 10 HSL compounds.	for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsu from boring 10 HSL compounds.	for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsu from boring 10 HSL compounds.	for
Samples Taken No. of Samples Types of Samples Date Sampled Samplers Samples Analysed  Split Samples Recipient Comments Subsu from boring 10 HSL compounds.	for

Site <u>Dead</u>	Creek Site-K	Boring/Well No. K-2
Sample Dep	oth Blow Count	Description
1 - 2.5	10-11-25	FILL consisting of brown-gray-black sandy CLAY with crushed limestone, gravel, and brick fragments. Moist.
3.5 - 5	3-4-5	Same as above.
6 - 7.5	1-2-2	Same as above. Silty and soft.
8.5 - 10	2-2-1	Same as above. Trace of medium grain sand and small gravel. Very moist.
11 - 12.5	3-3-4	Same as above. Trace of wood chips. Wet. Fill discontinues @ approx.
13.5 - 15	1-6-8	Firm dark gray-gray very fine grain SAND. Well rounded and well sorted. Black streaking @ 13 3/4' (-2"). Wet.
16 - 17.5	2-4-4	Same as above. Natural black staining.
18.5 - 20	10-11-14	Same as above. Cleaner. Wet.
		E.O.B. @ 20'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	
Prepared by	Kevin Phillips

Depth (ft) Description



R-2  Ing Elev. NA Ing drilling Inmon Index 1/12, 1/12/ 1e B-61  I 3 3/4" I.D. ITS IDATA  Oft. Diam.  Date Date Yes No Vity
og Elev. NA  x drilling  mmon  Dates 1/12, 1/12/  le B-61  3 3/4" I.D.  rs  DATA  6 ft.  Diam.  Date  Date  Date  Ves  No  vity
og Elev. NA  x drilling  mmon  Dates 1/12, 1/12/  le B-61  3 3/4" I.D.  rs  DATA  6 ft.  Diam.  Date  Date  Date  Ves  No  vity
## drilling
## drilling
J 3 3/4" I.D. ES DATA  Oft. Diam.  T DATA  Date Date Ves No
J 3 3/4" I.D. ES DATA  Oft. Diam.  T DATA  Date Date Ves No
J 3 3/4" I.D. ES DATA  Oft. Diam.  T DATA  Date Date Ves No
O ft. Diam.  Date Date No vity
O ft. Diam.  Diam.  T DATA  Date Poss No
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Yes No_X
ace soil samples 10' analyzed for
10' analyzed for
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		•
Site Dead Creek Site-K	Boring/Well No.	<u>K-1</u>

## Sample Depth Blow Count

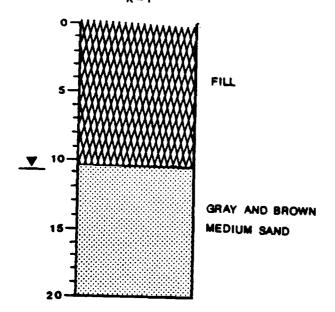
## Description

1 - 2.5	14-11-11	FILL consisting of dark brown silty CLAY. With crushed limestone and brick fragments. Trace of medium grain sand and small gravel.
3.5 - 5	2-2-1	Same as above. Moist.
6 - 7.5	1-2-1	Same as above.
8.5 - 10	2~3-6	Same as above. Slightly stained. FILL discontinues @ approx. 10.5'.
11 - 12.5	3-6-9	Gray-brown medium grain SAND. Wet. Some black staining $(0.11)^{1/2}$ Thin clay layer at $(1.12)^{1/2}$ (-3.5%).
3.5 - 15	3-5-7	Gray-brown medium grain SAND. Wet.
.6 - 17.5	3~3~4	Gray-brown medium to coarse grain SAND. Trace of small gravel. Wet.
18.5 - 20	2-3-4	Same as above.
		E.O.B. @ 20' -

3140		
12-16-86		
m Maley		
	12-16-86	12-16-86

Description

K - 1



Boring/Well No.	K-1
Location Site	K-1
Owner IEPA	
Ton of Inner Carl	no Play Wh
Drilling Firm F	ox drilling lammon on Dates12/16,12/16
Driller Jerry H	lamon
Start & Completio	n Dates12/16 12/16
Type of Dia Moh	110 B-61
	g <u>3 3/4" I.D.</u>
werned of Diffill	3 3/4" I.D.
hollow stem aug	ers
WEL	L DATA
Hole Diam. S in	.0 ft.
Boring Depth 20	.0 ft.
Casing and Screen	Diam.
Screen Interval	
Screen Type	
Stickup	
Well Type	
Well Construction	
Piltar Bash	•
LITTAL MEEK	
2681	
GIOGE	
Lock No.	
TE	ST DATA
Static Water Elev	Date Date
Static Water Elev	Date
Slug Test	Yes No
Test Date	
Hydraulic Conduct	ivity
other	•
WATER	QUALITY
	Yes Mo 1
Campler Tabes	
Samples Taken	
Samples Taken No. of Samples	
Samples Taken No. of Samples Types of Samples	
Date Sampled	
Date Sampled	
Date Sampled	
Date Sampled Samplers Samples Analyzed	for
Date Sampled Samplers Samples Analyzed Split Samples	
Date Sampled Samplers Samples Analyzed	for
Date Sampled Samplers Samples Analyzed Split Samples Recipient	for
Date Sampled Samplers Samples Analyzed Split Samples Recipient Comments Subsur	for No
Date Sampled Samplers Samples Analyzed  Split Samples Recipient Comments Subsur from boring 0 -	for
Date Sampled Samplers Samples Analyzed Split Samples Recipient Comments Subsur	for No
Date Sampled Samplers Samples Analyzed  Split Samples Recipient Comments Subsur from boring 0 -	for No
Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsur from boring 0 - HSL compounds.	for
Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsur from boring 0 - HSL compounds.	for
Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsur from boring 0 - HSL compounds.	for
Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsur from boring 0 - HSL compounds.	for
Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsur from boring 0 - HSL compounds.	for
Date Sampled Samplers Samples Analyzed  Split Samples Recipient  Comments Subsur from boring 0 - HSL compounds.	for

Sit.	Dead (	Crook	Site-J	_	Boring/Well	Ho.	J-3	

Sample Dept	h Blow Cous	Description
		Foundry sand on surface.
- 2.5	4-5-8	FILL consisting of black-dark brown sandy CLAY. Trace of medium grain sand (foundry) and brick fragments.
.5 - 5	6-9-14	Same as above. Auger refusal at 5'. Large obstruction encountered.  Moved boring 6' north. Continue sampling.
- 7.5	2-2-3	FILL consisting of black-dark brown sandy CLAY. Trace of medium grain foundry sand and slag material. Loose and dry @ 10'.
.5 - 10	3-3-3	Same as above.
1 - 12.5	2-2-1	Same as above. Moist.
3.5 - 15	1-2-3	Same as above. Wet.
6 - 17.5	1-2-8	Same as above. Fill discontinues @ approx. 18'.
8.5 - 20	2-5-7	Brown-gray medium grain SAND. Wet.
3.5 - 25	4-7-10	Same as above. Increased coarse grain sand.
	}	B.O.B. @ 25'

æ.

Project Name	Dead Creek		Boring/Well No J-3
Project No	L 3140		Location Site J
Date Prepared	12-17-86		Owner IEPA
Prepared by	im Maley		Top of Inner Casing Elev. NA
		<del></del>	Drilling Firm Fox drilling
Depth (ft)	Descripti	on	Driller Jerry Hammon
•	•		Start & Completion Dates12/17,12/17/86
			Type of Rig Mobile B-61
	J - 3		
'	• •		Method of Drilling 3 3/4" I.D.
A-4444	41414141414141414141414141414141414141		hollow stem augers
גגגרי	(XXXXXXYYYYYYYYYYY		
7			WELL DATA
-1444		•	
-1, 1, 1, 1	**************************************		Hole Diam. 8 in.
<b>-</b> KXX	***************************************		Boring Depth 25.0 ft.
5-1			Casing and Screen Diam.
	***************************************		Screen Interval
<b>גגגר</b>	XXXXXXXXXYYYYYYYY		Screen Type
700	***************************************	FILL	Stickup
-1111	XXXXXXXXXXYYYYYYY	• • • • • • • • • • • • • • • • • • • •	Stickup Well Type
<b>-1</b>	UXXXXXXXXXXXYYYYYY		Well Construction:
10- <b>X</b> XX	***************************************		Filter Pack
-1444	WYYYYXXXXXXXXXX		Seal
	AAAAAAXXXXXXXYYYYY		Grout
_ <b>_</b>	AXXXXXXXXXXYYYY		Lock No.
1W			
- <del>-                                    </del>	MYYYYXXXXXXXXX		TEST DATA
15-WW	<b>KYYYYXXXXXXXXX</b>		
- <b>I</b>	AAXXXXXXXXXXYYYI	•	Static Water Elev Date
<b>-1</b>	MYYYYYXXXXXXXXXXXX		Static Water Elev. Date
J. J. J. J. J. J. J. J. J. J. J. J. J. J	***************************************		Static Water Elev. Date Slug Test Yes No
2000			Test Date
			Hydraulic Conductivity
20-			Other
<b>-</b>		BROWN AND GRAY	
= 0.000		MEDIUM SAND	
-			WATER QUALITY
25			females Wakes Was Was
			Samples Taken Yes No_X
			No. of Samples
			Types of Samples
			Pata Sapalad
			Date Sampled
			Samples Analyzed for
			Samples Analysed tot
			Split Samples(soil)Yes X No
			Recipient Sverdrup, Inc. for Cerro
			Copper
			Comments Subsurface soil sampled
			from boring 0 - 10' analysed for
			HSL compounds.
			REMARKS
			Ground elev. 412.89

Site Dead Creek Site-J Boring/Well No. J-2
--

Sample Depth 1	Blow Count	Description
		Black foundry sand on surface.
1 - 2.5	5-5-27	FILL consisting of black-dark gray sandy CLAY. Some foundry sand and crushed limestone fragments.
3.5 - 5	5-6-7	Same as above. Fill discontinues @ approx. 6'.
5 - 7.5	2-2-3	Gray silty CLAY. Slightly mottled. Trace of fine grain sand.
8.5 - 10	2-3-4	Same as above. Siltier and trace of small gravel # 10'.
11 - 12.5	2-3-3	Gray fine grain sandy SILT. Wet @ 13'.
3.5 - 15	3-4-4	Same as above. Wet.
16 - 17.5	2-2-2	Same as above.
18.5 - 20	1-1-2	Same as above. Varved @ 19'.
21 - 22.5	1-1-9	Gray medium to coarse grain SAND. Trace of small gravel. Wet. Gasoline odor.
23.5 - 25	4-9-14	Same as above. Wet.
		E.O.B. # 25'

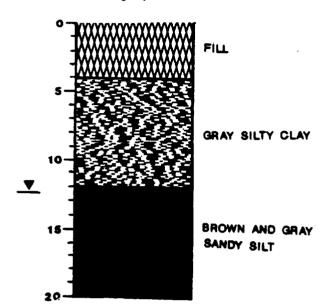
Project Name Dead Creek
Project No. IL 3140 Boring/Well No. Location Site J Owner IEPA Date Prepared 12-17-86
Prepared by Tim Maley Top of Inner Casing Elev. NA Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates12/17,12/17/86 Depth (ft) Description Type of Rig Mobile B-61 J - 2Method of Drilling 3 3/4" I.D. hollow stem augers MELL DATA FILL Hole Diam. 8 in. Boring Depth 25.0 ft. Casing and Screen Diam. Screen Interval Screen Type Stickup Well Type Well Construction: GRAY SILTY CLAY Filter Pack Seal Grout Lock No. TEST DATA 15 Static Water Elev. \_ Date Date Static Water Elev. Slug Test GRAY SANDY SILT Test Date Hydraulic Conductivity 20 Other GRAY MED - CRS SAND WATER QUALITY Samples Taken Yes\_ No\_X No. of Samples Types of Samples Date Sampled Samplers Samples Analyzed for Split Samples(soil)Yes X Recipient Sterling steel Comments Subsurface soil samples from boring 15 - 25' analyzed for HSL compounds. REPLARES Gasoline odor Ground elev. 413.10

Site Dead Cr	ook Sito-J	Boring/Well No. J-1
Sample Depth	Blow Count	Description
		Black foundry SAND on surface.
1 - 2.5	4-4-8	FILL consisting of black-dark brown-rust colored medium grain SAND.  Trace of crushed limestone and brick fragments.
3.5 - 5	2-5-6	Foundry sand FILL to 4'. Then: Gray silty CLAY. Slightly mottled. Trace of fine grain sand.
6 - 7.5	2-2-4	Same as above.
8.5 - 10	3-3-4	Same as above. Siltier @ 10'.
11 - 12.5	3-4-6	Light brown silty SAND. Becomes sandy SILT at 12'.
13.5 - 15	2-4-5	Brown sandy SILT. Wet.
16 - 17.5	3-5-6	Same as above.
18.5 - 20	2-2-3	Dark gray sandy SILT. Some fine grain sand. Wet.
		E.O.B. @ 20'

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	12-17-86
Prepared by _	Tim Maley
_	

Description

.1 — 1



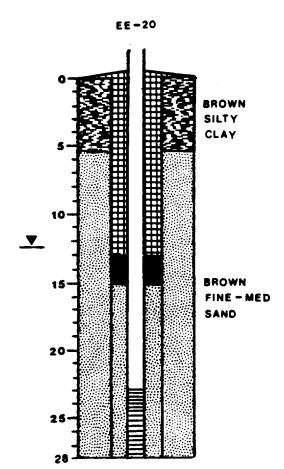
Location Site J
Auma - TPD1
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
The of Big Mabile B-61
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D.
hollow stem augers
WELL DATA
Hole Diam. 8 in. Boring Depth 20.0 ft. Casing and Screen Diam.
Basing Bookh 30 0 44
Boring Depen 20.0 rc.
Casing and Screen Diam.
Scient Interval
Screen Type
Stickup
Stickup Well Type
Well Construction:
Well Type Well Construction:
Filter Pack
2681
Grout
7 a.a.b. Ma
LOCK NO.
TEST DATA
1991 DATA
Static Water Elev Date
Static Water Elev Date
Slug Test Yes No
Static Water Elev. Date Static Water Elev. Date Slug Test Yes No No No No No No No No No No No No No
Hydraulic Conductivity
Other
Other
WATER QUALITY
Samples Taken Yes No X
No. of Samples
Samples Taken Yes No X No. of Samples Types of Samples
-19
Date Sampled
Samplers
SamplersSamples Analyzed for
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No Recipient Sterling steel
Split Samples(soil)Yes X No Recipient Sterling steel
Split Samples(soil)Yes X No Recipient Sterling steel Comments Subsurface soil sample
Split Samples(soil)Yes X No Recipient Sterling steel  Comments Subsurface soil sample from boring 10 - 20' analyzed for
Split Samples(soil)Yes X No Recipient Sterling steel Comments Subsurface soil sample
Split Samples(soil)Yes X No Recipient Sterling steel  Comments Subsurface soil sample from boring 10 - 20' analyzed for
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No
Split Samples(soil)Yes X No

lte <u>Dead Cree</u>	IK 3150-1	Boring/Well No. I-12/Well #EE-20
mple Depth H	low Coun	Description
		Dark brown sandy clay topsoil on surface.
- 2.5	2-3-2	Brown silty CLAY. Dry.
5 - 5	3-3-2	Same as above.
- 7.5	3-3-5	Brown fine to medium grain SAND. Dry.
5 - 10	3-5-8	Same as above.
- 12.5	3-5-8	Same as above. Moist @ 12.5'.
.5 - 15	4-8-13	Same as above. Wet.
- 17.5	1-2-4	Same as above.
.5 - 20	2-5-9	Same as above.
- 22.5	3-5-11	Same as above.
.5 - 25	4-7-11	Brown medium grain SAND. Wet. Trace of coarse grain sand @ 24-25'.
- 27.5	7-11-20	Same as above. Trace of small gravel. Wet.

E.O.B. @ 28'

Project Name	Dead Creek
Project No	2-13-67
Prepared by _	Tim Maley

Description



BOTING/WELL NO. 1-11/EE-20
Location Site I Owner IEPA
Owner IEPA
Top of Inner Casing Elev. 411.41
Drilling Firm Fox drilling Driller Jerry Hammon Start & Completion Dates 2/13, 2/13/
Driller Jerry Hammon
Start & Completion Dates 2/13. 2/13/
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
method of Drilling 3 3/4" 1.D.
hollow stem augers, Rotary
WELL DATA
Hole Diam. 8 in. Boring Depth 28 ft.
Boring Depth 28 ft.
Casing and Screen Diam. 2 in. Screen Interval 23 - 28 ft.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" sl
Stickup 1.41 ft.
Stickup 1.41 ft. Well Type monitoring
Mail the mourceful
well construction:
Filter Pack 28 - 15 ft. Natural
Filter Pack 28 - 15 ft. Natural Seal 15 - 13 ft. Grout 13 ft. to surface Lock No. 2834
Grout 13 ft. to surface
Lock No. 2834
TEST DATA
Static Water Elev.       397.49 Date 3-26-         Static Water Elev.       398.91 Date 5-11-         Slug Test       Yes
Static Water Elev. 398.91 Date 5-11-
Slug Test Yes No X
Hydraulic Conductivity
Other
WATER QUALITY
EARNIAS TAPAR VAS Y
Samples Taken Yes X No
No. of Samples 1 round
Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
No. of Samples 1 round Types of Samples groundwater
<del></del>
Date Sampled 3-23-67
Date Sampled 3-23-67
Date Sampled 3-23-87 Samplers E E Samples Analysed for HSL compounds
Date Sampled 3-23-67
Date Sampled 3-23-87 Samplers E E Samples Analysed for HSL compounds
Date Sampled 3-23-87 Samplers E & E Samples Analysed for HSL compounds volatile organics
Date Sampled 3-23-87  Samplers E & E  Samples Analysed for HSL compounds volatile organics  Split Samples Yes X No
Date Sampled 3-23-87  Samplers E & E  Samples Analysed for HSL compounds volatile organics  Split Samples Yes X No
Date Sampled 3-23-87  Samplers E & E  Samples Analysed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No  Recipient Sverdrup, Inc. for Cerro Copper
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No  Recipient Sverdrup, Inc. for Cerro Copper
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No  Recipient Sverdrup, Inc. for Cerro Copper
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No  Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analys
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for MSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No  Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analys
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.
Samplers E & E Samples Analysed for volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analys for HSL compounds.
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.
Date Sampled 3-23-87  Samplers E & E  Samples Analyzed for HSL compounds volatile organics  Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro Copper  Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyze for HSL compounds.

Site Dead Creek Site-I			Boring/Well Bo. 1-11 (cont.)	
ample Dept	h Blow Coun	<b>t</b>	Description	
3.5 - 35	4-7-13	Same as above.		
7 - 38.5	8-17-16	Same as above.		
		E.O.B. @ 38.5'		
	. ,			
		•		

Site Dead C	reek Site-I
-------------	-------------

Boring/Well Mo. I-11

Sample Depth Blow Co	unt Description
	Crushed limestone parking lot surface.
1 - 2.5	FILL consisting of black-dark brown sandy CLAY with brick fragments, crushed limestone, small gravel, and slag material.
3.5 - 5 5-6-7	Same as above.
6 - 7.5 4-4-3	FILL consisting of gray-black silty CLAY. Trace of medium grain sand and gravel. Moist.
8.5 - 10 1-5-2	FILL consisting of soft black-gray silty CLAY. Slightly mottled. Moist.
11 - 12.5 3-2-2	WASTE consisting of black soft sandy clay (sludge) with some debris including a hard rubber material and coarse grain sand. Wet with an oily sheen.
13.5 - 15 4-5-4	WASTE - same as above. More hard rubber material and black stained debris.
16 - 17.5 7-11-9	WASTE - same as above. Trace of paper products, clay, and small gravel. Wet with black oily sheen.
18.5 - 20 7-22-9	WASTE - same as above.
	* Very difficult drilling @ 21'. Possible large metalic object encountered. Destroyed fish-tail bit on end of plug. Re-locate boring -20' east. Continue logging @ 21-22.5'.
21 - 22.5 2-2-4	Poor recovery - WASTE consisting of black oily material with a hard rubber like debris. Wet.
	WASTE discontinues # approx. 23'.
23.5 - 25 2-10-1	23.5-23 3/4 Thin soft gray silty clay layer. (-1" to 2" thick) Then brown fine grain SAND. Some black staining. Wet.
26 - 27.5 1-2-5	Dark gray fine grain SAND. Trace of medium to coarse grain sand. Wet with some black staining.
28.5 - 30 5-8-14	Same as above. Trace of small to medium gravel @ 29-30'.
31 - 32.5 9-13-20	Same as above.

Broject Meme De	and Creek	Boring/Well Ho
	ad Creek	Location Site I
Project No. <u>IL</u> Date Prepared <u>1</u>	2-3-47	Owner IEPA
Prepared by Tis	Maley	Top of Inner Casing Elev. NA
		Drilling Firm Fox drilling
Denth (ft)	Description	Driller Jarry Hammen
oupen (cc)	bescription .	Driller Jerry Hammon Start & Completion Dates 2/5 & 2/5/87
		Type of Rig Mobile 8-61
		Type of kidHobite 8-01
	I <b>–</b> 11	Method of Drilling 3 3/4" I.D.
		hollow stem augers, Rotary
0 7111111	1111111111111111	100000 0000 0000 00000
- <b>!</b> /////	YYYYYYYYI	WELL DATA
- <b>I</b> YYYYY		····
	YYYYYYXXXXXI	Hole Diam. \$ in.
	XXXXXXXXXXXX	Boring Depth 38.5 ft.
	XXXXXXXXXXXI	Casing and Screen Diam.
3 TKXXXXXX	<u> </u>	Screen Interval
	(XXXXXXXXXXI	Screen Type
<b>-KXXXXX</b> )	XXXXXXXXXXX	Stickup
	KAKAKAKAKAK	Well Type
<b>-KXXXXX</b>	XXXXXXXXXXXX	Well Construction:
<u> </u>	XXXXXXXXX	Filter Pack
		Seal
722		Seal Grout
TEST		Lock No.
一位通常		TEST DATA
15-		
- 22.0	WASTE	Static Water Elev Date
-5333		Static Water Elev. Date
-23.33		Slug Test Yes No No Test Date
1. 10		Hydraulic Conductivity
20-		Other
		Other
	金融を表現	<del>-,,</del>
	\$44 \( \tau \)	
ACCOMPANY	GRAY SILTY CLAY	WATER QUALITY
1		
25-		Samples Taken Yes No_X
		No. of Samples
-		Types of Samples
-		
4		Asks damaled
30-		Date Sampled Samplers
-	BROWN AND DARK	Samples Analyzed for
_		
	GRAY FINE SAND	
35-		Split Samples(soil)Yes_X No
		Recipient Sverdrup, Inc. for Cerro
		Copper
38.5		Comments Subsurface soil samples
		from boring 6 - 20' & 26 - 38.5' analysed for HSL compounds.
		energed for HSC Compounds.
		· · · · · · · · · · · · · · · · · · ·
		reparks
		Ground elev. 405.88

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Site	Dead	Creek	Site-I	
	Desc	~	-1	

Boring/Well No. I-10

Sample Depth B	low Count	Description
		FILL material on surface.
1 - 2.5	12-15-12	FILL consisting of black-brown sandy CLAY including a mixture of wood, slag gravel, crushed limestone, a yellow powdery substance, and brick fragments. Dry.
3.5 - 5	6-3-3	FILL - same as above.
		Fill discontinues # approx. 6.5'.
6 - 7.5	2-2-2	From 6.5' - brown very fine silty SAND. Dry. Trace of clay @ 7.5'.
8.5 - 10	4-3-3	Brown silty CLAY. Trace of fine grain sand. Slightly mottled with gray stringers. Dry.
11 - 12.5	6-6-8	Gray very fine silty SAND. Moist.
13.5 - 15	3-3-6	Same as above. Wet.
16 - 17.5	3-7-9	Same as above. Less silty, wet.
18.5 - 20	2-5-7	Brown fine grain SAND. Black staining @ 19-19.5'. Wet.
21 - 22.5	6-9-5	Same as above. Becomes gray fine grain SAND.
23.5 - 25	6-9-13	Same as above. Black staining @ 24.5-25'.
26 - 27.5	7-11-12	Same as above. Black staining.
28.5 - 30	11-12-14	Same as above.
		E.O.B. @ 30'

	<del></del>	<del></del>
Project Name Dead C	:reek	Boring/Well No. I-10
Project No. IL 3140		Location Site I
Date Prepared 2-4-6		Owner IEPA
Prepared by Tim Mal	Lev	Top of Inner Casing Slev. NA
	<del></del>	Drilling Firm Fox drilling
Depth (ft)	Description	Driller Jerry Hammon
30 <b>y</b> tii (30)		Start & Completion Dates 2/4 & 2/4/87
		Type of Rig Mobile B-61
		Type of kid
1 -	10	Method of Drilling _ 3 3/4" I.D.
_		hollow stem augers
AAAAAAAKT O	AAAAAAAAA	
<b>*</b> ***********	KXXXXXXXX	WELL DATA
<b>-</b>	XXXXXXYI	
-1,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3,3	(XXXXXXXXI FILL	Hole Diam. 8 in.
<b>-</b> FXXXXXXXXXX	XXXXXXXI	Boring Depth 30.0 ft.
s—IXXXXXXXX	(XXXXXXXX)	Casing and Screen Diam.
	XXXXXXXX	Screen Interval
THE THE PERSON NAMED IN	THE THE PARTY OF T	Screen Type
	BROWN SILTY SAND	Stickup
535(4)		Well Type
12.56	BROWN SILTY CLAY	Well Construction:
10-2-2-2		Filter Pack
4		Seal
		Grout
		Lock No.
7	GRAY VERY	
7	FINE SAND	TEST DATA
15-		
4		Static Water Elev. Date Static Water Elev. Date
4	· 1	Static Water Elev Date
		Slug Test Yes No
		Test Date
		Hydraulic Conductivity
20-		Other
-		WATER QUALITY
25-	BROWN FINE SAND	
		Samples Taken Yes No X
		No. of Samples
		Types of Samples
		Bake damalad
30	omio Washi Mik	Date Sampled
		Samples Analyzed for
		Samples Analysed for
		Split Samples(soil)Yes X No
		Recipient Sverdrup, Inc. for Cerro
		Copper
		Comments Subsurface soil samples
		from boring 15 - 30' analyzed for
		HSL compounds.
		<del></del>
		REMARKS
		Ground elev. 408.68
		<del></del>

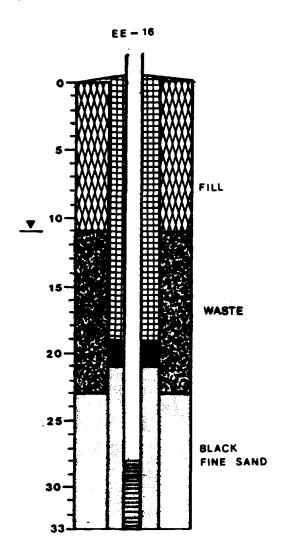
Sample Depti	Blow Count	Description		
		Fill materials on surface.		
1 - 2.5	5-8-10	FILL consisting of black clayey SAND and slag gravel. Dry.		
3.5 - 5	4-5-5	FILL - same as above.		
6 - 7.5	2-6-6	FILL consisting of black-brown sandy CLAY including a mixture of slag gravel, crushed limestone, and cinders. Dry.		
8.5 - 10	4-12-4	FILL - same as above; mostly slag gravel and cinders.		
11 - 12.5	2-3-2	WASTE consisting of black sandy oily stained sludge including a mixture of wood, cardboard, slag, and small spherical beads. Wet.		
13.5 - 15	4-10-19	WASTE - same as above. Wet.		
16 - 17.5	100/6	WASTE - no recovery; very difficult drilling due to large obstruction.		
18.5 - 20	6-12-9	WASTE - cuttings from large obstruction showed a hard rubber or graphite material.		
21 - 22.5	72-100/6	WASTE - no recovery; probably same fill materials. Fill appeared to discontinue @ 23'.		
23.5 - 25	4-4-5	Black (stained) fine grain SAND. Wet (with oily sheen).		
26 - 27.5	5-6-12	Same as above, heavy oily staining.		
28.5 - 30	7-12-9	Same as above; with a trace of medium to coarse grain SAND.		
j		E.O.B drill to 33'		

~

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	2-4-87
Prepared by	Tim Maley

Depth (ft)

Description



Boring/Well No. I-9/EE-16 Location Site I
Owner IEPA Top of Inner Casing Elev. 408.65
Drilling Firm Fox drilling
Driller Jerry Hammon
Driller Jerry Hammon Start & Completion Dates 2/4/87,2/4/87
Type of Rig Mobile B-61
Method of Drilling 3 3/4" T D
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
WELL DATA
Holo Dies A in
Hole Diam. 8 in. Boring Depth 33 ft.
Casing and Screen Diam. 2 in. Screen Interval 28 - 33 ft.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot Stickup 1.74 ft. Well Type monitoring
Stickup 1.74 ft.
Well Construction:
Filter Pack 33 - 21 ft. Matural
Seal 21 - 19 ft.
Grout 19 ft. to surface
Filter Pack 33 - 21 ft. Natural Seal 21 - 19 ft. Grout 19 ft. to surface Lock No. 2834
TEST DATA
Static Water Elev. 397.27 Date 3-26-87
Static Water Elev.       397.27 Date 3-26-87         Static Water Elev.       398.56 Date 5-11-87         Slug Test       Yes            No X
Slug Test Yes No X
Hydraulic Conductivity
Other pH = 7.2
Other pH = 7.2  Cond. = 3000 umhos Temp. = 58° F  Dark, cloudy, strong odor
WATER QUALITY
-
Samples Taken Yes X No No 1 round
No. of Samples 1 round
Types of Samples groundwater
Date Sampled 3-23-86
Samplers E 4 E Samples Analyzed for HSL compounds
compres Misthess for use combonings
Split Samples Yes X No
Split Samples Yes X No Recipient Sverdrup, Inc. for Cerro
Copper
Comments Subsurface soil samples from boring 6.5 - 22.5 feet and
23.5 - 30' feet analyzed for HSL
compounds.
REMARKS

Site Dead Creek Site-I

Boring/Well So. I-8/Well #EE-G112

IEPA replacement well

_		Depth	-	
2	SEDIO.	Depth	BIOA	COMME

#### Description

Straight drill to 17.5'.

Stratigraphic sequence based on auger cuttings.

0'to 5' FILL consisting of brown fine to medium grain SAND including crushed limestone, gravel, and brick fragments.

5'to 12' FILL consisting of black asphaltic sand and gravel including oily cinders and soft clay.

Fill discontinues @ approx. 13'.

12' to 17' Gray silty clay.

17'to 23' Brown to gray fine grain SAND. Some silt. Wet.

23 to 27.5' Brown to gray medium grain SAND. Trace of small gravel. Wet.

27.5' to 27 3/4' Gray silty clay. Moist.

27 3/4' to 29' Gray fine grain SAND.

#### Three samples taken for screen placement.

2-3-4 Brown fine grain SAND. Wet.

Gray fine to medium grain SAND. Trace of coarse grain sand and small 22.5 - 24 4-5-7 gravel. Wet.

4" gray silty clay layer on top of gray fine grain SAND. Wet.

E.O.B. @ 29'

17.5 - 19

27.5 - 29 6-7-9

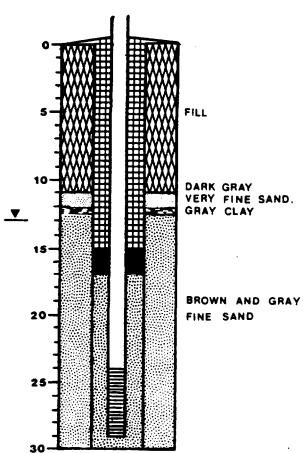
Date Prepared Prepared by Ti	3140 2-3-87 m Maley	Boring/Well No. I-8/EE-G112 Location Site I  Owner IEPA Top of Inner Casing Elev. 407.87 Drilling Firm Fox drilling
Depth (ft)	Description	Driller Jerry Hammon Start & Completion Dates 2/3/87,2/3/87 Type of Rig Mobile B-61
	EE-G112	Method of Drilling 3 3/4" I.D. hollow stem augers
5-WW	FILL	Hole Diam. 8 in. Boring Depth 29.0 ft. Casing and Screen Diam. 2 in. Screen Interval 21 - 26 ft. Screen Type stainless steel 0.01" slot Stickup 1.19 ft. Well Type monitoring Well Construction: Filter Pack 26 - 16 ft. Natural Seal 16 - 14 ft. Grout 14 ft. to surface Lock No. 2834
15-	GRAY CLAY	Static Water Elev. 397.00 Date 3-26-87 Static Water Elev. 398.39 Date 5-11-87 Slug Test Yes X No Test Date 5-12-87 Hydraulic Conductivity 3.4 x 10 cm/sec Other ph = 7.6 Cond. = 1600 umhos Temp. = 58° F Yellowish, slight odor WATER QUALITY
25-	GRAY FINE SAND	Samples Taken Yes X No No. of Samples 1 round Types of Samples groundwater
		Date Sampled 3-23-87 Samplers E E E Samples Analyzed for HSL compounds
		Split Samples Yes No X Recipient
		Comments
		REMARKS

Sample Depth	Blow Count	Description
		0-1 Black clayey topsoil
1 - 2.5	3-3-4	FILL consisting of brown-gray silty CLAY. Dry.
3.5 - 5	4-8-4	FILL consisting of brown-gray silty CLAY. Trace of fine grain sand and crushed limestone. Dry.
6 - 7.5	1-1-1	FILL - same as above. Moist.
8.5 - 10	3-4-8	FILL consisting of brown-gray-black silty CLAY. Some fine to medium grain sand and crushed limestone. Dry.
		Fill apparently discontinues # approx. 11'.
11 - 12.5	1-3-4	11-12' Dark gray very fine grain SAND. Moist.  12-12.5 Soft gray silty CLAY. Moist. Water @ 13'.
13.5 - 15	1-3-	Brown fine grain SAND. Wet.
16 - 17.5	1-3-5	Same as above.
18.5 - 20	2-6-8	Same as above; slightly siltier.
21 - 22.5	12-15-15	Same as above; less silt.
23.5 - 25	5-8-12	Gray very fine grain SAND. Wet.
26 - 27.5	12-10-10	Same as above.
28.5 - 30	6-8-10	Same as above.
		E.O.B. @ 30'

Project Name
Project No. IL 3140
Date Prepared 2-3-87
Prepared by Tim Maley

Depth (ft) Description

EE=15



Boring/Well No. I-7/EE-15 Location Site I
Location Site I 'Owner IEPA
Top of Inner Casing Elev. 406.41
Drilling Firm Fox drilling
Driller Jerry Hammon Start & Completion Dates 2/3/87,2/3/87
Type of Rig Mobile B-61
Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary
hollow stem augers, Rotary
WELL DATA
Hole Diam. 8 in. Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 24 - 29 ft.
Streen Type stainless steel 0.01" slot Stickup 1.33 ft.
Well Type monitoring
Well Construction:
Filter Pack 29 - 17 ft. Natural
Filter Pack 29 - 17 ft. Natural Seal 17 - 15 ft. Grout 15 ft. to surface Lock No. 2834
Lock No. 2834
TEST DATA
Static Water Elev. 397.63 Date 3-26-87
Static Water Elev. 398.93 Date 5-11-87
Test Date 5-12-87
Hydraulic Conductivity 0.47 x10 cm/sec
Other pH = 7.2 Cond. = 1800 umhos Temp. = 56° P
Yellowish
MATER QUALITY
Samples Taken Yes X No No. of Samples 1 round
No. of Samples 1 round Types of Samples groundwater
Types of Samples
Date Sampled 3-23-87
Samblera E & E
Samples Analysed for HSL compounds
Split Samples Yes X No
Recipient Sverdrup, Inc. for Cerro Copper
from boring 3.5 - 12.5 feet and
13.5 - 22.5 feet analyzed for HSL
compounds.
REMARKS
Slight odor

4

Site Dead Creek Site-I Boring/Well Ho. I-6				
Sample Deg	oth Blow Coun	Description		
		Fill on surface.		
1 - 2.5	24-12-14	Fill on surface.  FILL consisting of brown silty CLAY including a mixture of fine to coarse grain sand, gravel, and crushed limestone.		
3.5 - 5	3-60/3	FILL - same as above. High blow count caused by brick obstruction.		
6 - 7.5	3-10-10	grain sand, gravel, and crushed limestone.  FILL - same as above. High blow count caused by brick obstruction.  FILL - same as above; with additional debris such as cardboard, cinders, and slag.		

8.5 - 10

3-2-2

FILL - same as above; with increased amount of sand. Moist.

11 - 12.5

3-2-1

WASTE consisting of gray silty CLAY including black oily sludge, fine to coarse grain sand, gravel, brick fragments, and slag. Wet (with oily film).

13.5 - 15

1-1-2

WASTE consisting of black (heavily stained) sandy CLAY. Including black oily sludge, medium to coarse grain sand. Wood chips, cinders, and gravel. Wet.

16 - 17.5 2-3-4 WASTE - same as above.

18.5 - 20 2-7-8 WASTE - same as above, some black sludge or tar-like substance mixed with wood and cardboard.

21 - 22.5

11-11-10

WASTE consisted of various debris including black oily stained layered cardboard, paint pigments, burlap cloth, and a yellow sludge-like substance. Wet.

WASTE discontinues # approx. 24'.

23.5 - 25 | 10-11-12 From 24', brown (some black staining) fine grain SAND. Some silt. Wet.

26 - 27.5 4-4-5 Same as above. A 1/4" gray silty clay layer @ 26.5'.

28.5 - 30 | 0-1-1 Brown fine grain SAMD. Some black staining. Wet.

31 - 32.5 | 10-13-18 Same as above.

E.O.B. @ 32.5'

Project Hope D	and Crank	Paris and 11 May 1.4
Project Name	ead Creek 3140	Boring/Well No. 1-6
Date Prepared	3140	Location Site I
Date Prepared	m Maley	Owner IEPA
Prepared by	RALLYY	Top of Inner Casing Elev. NA
Doneh (de)	Description	Drilling Firm Fox drilling Driller Jerry Hammon
Depth (Lt)	Descripcion	Start & Completion Dates 2/2 & 2/2/87
		Type of Rig Mobile B-61
	i <b>– 6</b>	Type of Rid Mobile 8-61
	1 – 0	Method of Drilling 3 3/4" I.D.
_	_	hollow stem augers
	XXXXXXXXXXX <b>X</b>	
<b>700000</b>	<b>*****************************</b>	WELL DATA
<b>-1</b>	XXXXXXXXXXXXII	Hole Diam. 8 in.
<b>-</b>	<b>*************************************</b>	Boring Depth 32.5 ft.
5- <b> </b> WWW	<b>/////////////////////////////////////</b>	Casing and Screen Diam.
<b>-!</b>	WWW FILL	Screen Interval
- <b>!</b>	<b>^</b>	Screen Type
_ <b>!</b> }	<b>*************************************</b>	Stickup
MYYYY	^^^^	
7	<b>YYYYYYYYYY</b> I	Well Construction:
▼ 10- <b>W</b>	^^^^	Filter Pack
1934	25000000000000000000000000000000000000	Seal
- <b>MEX</b>		G1996
-2002		Lock No.
15-		TEST DATA
-330	5、节念也没有"	Static Water Elev Date
- 2012	WAST	E Static Water Elev. Date
1		Slug Test Yes No No
		Test Date
		Hydraulic Conductivity
20-18-22	数第4000000000000000000000000000000000000	Other
70.07		
1323		
		WATER QUALITY
25-		
		Samples Taken Yes No X
		No. of Samples
		Types of Samples
	BROWN	FINE SAND
		Baka damalad
30-		Date Sampled
		Samples Analysed for
<del></del>		
		Split Samples(soil)Yes X No
		Recipient Sverdrup, Inc. for Cerro
		Copper
		Comments Subsurface soil sample
		from boring 10 - 25' analyzed for
		HSL compounds.
		REMARKS
		Ground elev. 408.30
		· · · · · · · · · · · · · · · · · · ·

Sample Depth	Blow Count	Description
		Crushed limestone parking lot surface.
1 - 2.5	24-00	FILL consisting of dark brown-black sandy CLAY including a mixture of fine to coarse grain sand, limestone fragments, clay, and concrete (large obstruction caused spoon refusal).
3.5 - 5	4-6-8	FILL consisting of black-gray silty CLAY.
6 - 7.5	11-14-8	FILL consisting of light gray-black sandy CLAY including crushed lime- stone, small to large gravel, fine to coarse grain sand, and wood chips. Dry.
8.5 - 10	4-17-4	FILL - same as above; with some brick fragments.
11 - 12.5	2-2-1	FILL consisting of gray silty CLAY. Some black staining, trace of fill debris including cloth products and cinders.
13.5 - 15	2-2-3	WASTE consisting of black sandy CLAY including a mixture of cinders, slag, small to large gravel, and fine to coarse grain sand. (Moist)
16 - 17.5	4-2-5	No recovery - probably same fill material. Water @ 17.5'.
18.5 - 20	3-5-3	WASTE consisting of black sandy CLAY including some gravel and slag. Wet (with oily sheen).
21 - 22.5	4-1-5	No recovery - probably same fill material.
23.5 - 25	5-9-5	WASTE - same as above. Fill apparently discontinues @ approx. 26'.
26 - 27.5	4-2-3	26-26 3/4' Black-gray-brown silty CLAY then black very fine grain SAND Some silt and black staining. Wet.
28.5 - 30	3-4-3	Black very fine grain SAND. Stained. Wet. From 29-29 1/4' is a gray silty CLAY layer. Then brown fine grain SAND. Slightly stained. Wet. Trace of medium grain sand.
31 - 32.5	2-4-2	Brown fine to medium grain SAND. Wet.
36 - 37.5	8-16-24	Brown medium to coarse grain SAND. Trace of small gravel. Wet. Tip of spoon (37.5') showed dark gray very fine grain SAND. Trace of small gravel.
		E.O.B. @ 37.5'

4

Project NameDe	ed Creek		Boring/Well No. <u>I-5/EE-14</u>
Project No. IL	3140		Location Site I
Date Prepared 1	-30-87		Owner IEPA
Prepared by Tim	Maley		Top of Inner Casing Elev. 410.95
	<del></del>		Drilling Firm Fox drilling
Depth (ft)	Description		Driller Jerry Hammon
	-		Start & Completion Dates 1/30, 1/30/87
			Type of Rig Mobile B-61
•	EE - 14		
•			Method of Drilling 3 3/4" I.D.
			hollow stem augers, Rotary
_			WELL DATA
O MANAGE	##WWW		WOLLD LIKE
<b>-1XXXXXH</b>	出 <del>III</del> WWI		Hole Diam. 8 in.
-1,,,,,,,,	ш <del>ш</del> имм		Boring Depth 37.5 ft.
-#********	# <b>##</b>		Casing and Screen Diam. 2 in.
-1,,,,,,,,	H HHWW		Screen Interval 32.5 - 37.5 ft.
ظ₩₩ظـــء	H HHWW		Screen Type stainless steel 0.01" slot
3 TAXAMB	ш <del>III</del> /////		Stickup 1.56 ft.
7,4,4,4,1	H HHWW		Well Type monitoring
1,,,,,,,,	⊞ ### <b>//////</b>		Well Construction:
-14444418	BI #######		Filter Pack 37.5 - 30 ft. Natural
-1,,,,,,	### <b>#</b>	•	Seal 30 - 28 ft.
10-WWH	III IIIIMWI FILL		Grout 28 ft. to surface
EMMAL	BI ###WWMI		Lock No. 2834
<b>▼</b> 7₩₩B	⊞ <b>;;;;</b> ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;		
<u> </u>	## <b>###</b>		test data
			Static Water Elev. 397.23 Date 3-26-87
			Static Water Elev. 398.55 Date 5-11-87
15-	出 田歌館		Slug Test Yes No X
			Test Date
-E/2541			Hydraulic Conductivity
			Other pH = 7.4
	# ####################################		Cond. = 3400 unhos Temp. = 56° F
20 - 20	WASTE		Cloudy, yellowish
19.63			WATER QUALITY
- 43724			
			Samples Taken Yes X No
25-			No. of Samples 1 round
23 23 64		_	Types of Samples groundwater
	GRAY CL.	AY	
]	***		Date Sampled 3-23-87
			Samplers E & E
20			Samples Analyzed for HSL compounds
30-			
	BROWN		· · · · · · · · · · · · · · · · · · ·
1	FINE - MI	ED -	
-	(A) (A) (A) (A) (A) (A) (A) (A) (A) (A)		Split Samples Yes X No
	SAND		Recipient Sverdrup, Inc. for Cerro
35-			Copper
4			
			Comments Subsurface soil samples
37.5			from boring 5' - 27.5 feet and
			28.5 - 37.5 feet analysed for HSL compounds.
			REMARKS

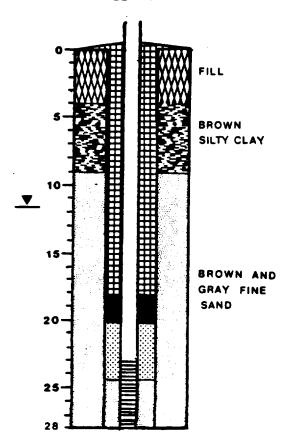
Sample Depth	Blow Count	Description
	1	Fill on surface.
1 - 2.5	8-7-50	FILL consisting of brown and black sandy CLAY, including a mixture of crushed limestone, small to medium gravel, and concrete fragments.
		Fill discontinues @ approx. 4'.
3.5 - 5	3-4-4	From 4', brown very silty CLAY. Dry.
6 - 7.5	3-4-5	Brown silty CLAY: to 9'.
8.5 - 10	2-3-2	From 9', brown very fine grain SAND. Some silt. Thinly bedded. Water @ 9.5'.
11 - 12.5	1-3-2	Same as above.
13.5 - 15	1-1-1	Same as above; some interbedding of siltier material. Wet.
16 - 17.5	1-2-3	Same as above; to 19'.
18.5 - 20	1-2-3	From 19', brown (turning gray) SILT. Wet.
21 - 22.5	1-2-2	Gray fine grain SAND. Wet.
23.5 - 25	0-1-0	Same as above.
26 - 27.5	0-1-2	Same as above.
		E.O.B. @ 28*

Project Name	Dead Creek
Project No.	IL 3140
Date Prepared	1-29-87
Prepared by _	Tim Maley

Depth (ft)

Description





Botting/ well No	-13
Location Site I	
Owner IEPA	
Top of Inner Casing Elev	400 16
Drilling Firm Fox dril	1400
Dilling Firm Fox dell	11119
Driller Jerry Hammon	
Start & Completion Dates	1/29,1/29/87
Type of Rig Mobile B-6	1
	<del></del>
WARE A SERVICE TO	148 4 5
Method of Drilling 3	74" 1.D.
hollow stem augers	
•	
WELL DATA	
Hole Diem & in	
Hole Diam. 8 in. Boring Depth 28.0 ft.	
Boring Depth 28.0 Ft.	<del></del>
Casing and Screen Diam.	2 in.
Screen Interval 23 - 2	8 Et.
Screen Type stainless st	eel 0.01" slot
Stickup 0.52 ft.	
Wall Super manibaring	
Well Type monitoring	
Well Construction:	
Filter Pack 28 - 20	ft.
Easl 20 - 18 #+	
Grout 18 ft to sur	face
Grout 18 ft. to sur Lock No. 2834	
LOCK NO	<del> </del>
TEST DATA	<b>\</b>
Static Water Elev. 397.4 Static Water Elev. 398.7	7 Date 3-26-87
Static Water Blay 308 7	5 Date 5-11-67
Slug Test Yes X	<u> </u>
Slug Test Yes X Test Date 5-12-87	No
Test Date	
Hydraulic Conductivity 1	.3 x 10 tm/sec
Other $pH = 7.2$	
Other pH = 7.2 Cond. = 1800 umhos Te	MD. = 56° 7
Clear to yellowish	
Clear to jerroussii	
MATER QUALIT	~
MILEY AOUTT	•
Complex Woken Voc V	w.
Samples Taken Yes X No. of Samples 1 round	o
No. or samples <u>l round</u>	
Types of Samples groun	dwater
Date Sampled 3-23-87	
Samplers E E E	
semplets be b	
Samples Analyzed for HSL	compounds
	· · · · -
Split Samples Yes_	X
Recipient Sverdrup, Inc.	for Cerro
Copper	<del></del>
Commonto	
Comments	
REMARES	
	<del></del>

ite <u>Dead</u>	Creek Site-I	Boring/Well Ho. I-3
ample Dep	th Blow Count	Description
<u>-</u>		Crushed limestone parking lot surface.
- 2.5	56-21-19	FILL consisting of brown and black sandy CLAY including crushed lime stone, small to medium gravel and slag material. Dry.
.5 - 5	5-11-5	FILL - same as above; with some wood chips.
		Fill discontinues @ approx. 6'.
- 7.5	2-3-4	Dark gray silty CLAY. Trace of fine grain sand.
.5 - 10	1-2-3	Same as above; some rust color staining.
1 - 12.5	1-2-2	Same as above; mottled brown 4 gray.
3.5 - 15	2-3-2	Same as above.
6 - 17.5	1-2-3	Same as above.
		Water # 18'.
8.5 - 20	1-1-3	Brown very fine grain SAND. Some silt, thinnly bedded. Wet.
1 - 22.5	2-3-3	Gray very fine grain SAND. Wet.
3.5 - 25	1-2-2	Same as above.
6 - 27.5	1-2-3	Same as above.
8.5 - 30	0-1-3	Same as above.
		E.O.B. # 30'

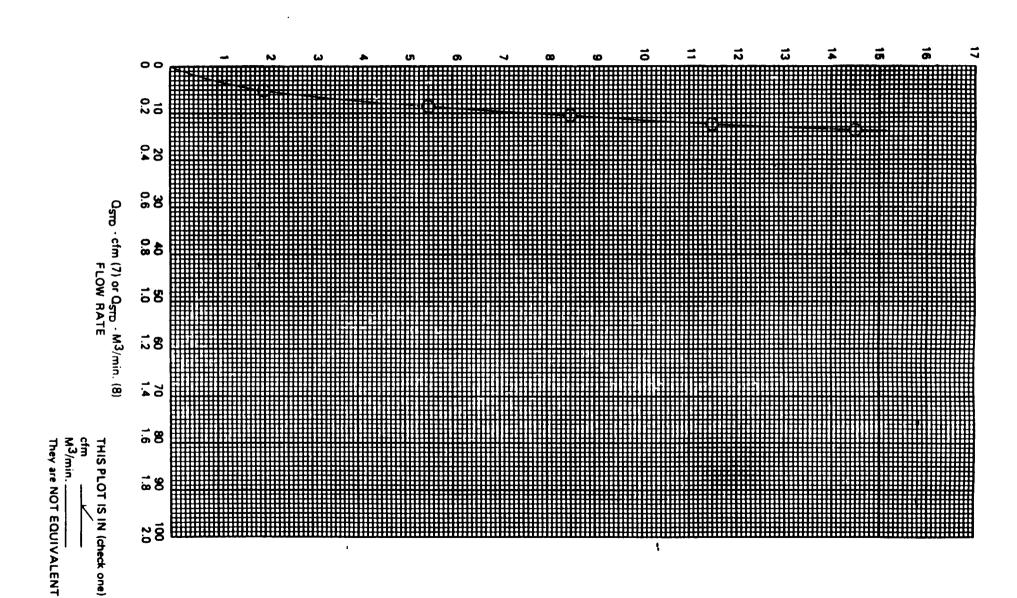
Project Name	Dead Creek		Boring/Well No
Project No. I			Location Site I
Dete Prepared		<del></del>	Owner IEPA
Prepared by 1	in Maley		Top of Inner Casing Elev. NA
	<del></del>	<del></del>	Drilling Firm Fox drilling
Depth (ft)	Descri	ntion	Driller Jerry Hammon
bepen (te/	545011	ption	Driller Jerry Hammon
			Start & Completion Dates 1/29, 1/29/87
			Type of Rig Mobile B-61
	1 - 3		
			Method of Drilling 3 3/4" I.D.
0-1444			hollow stem augers
ΥΥΥΓ	<b>/</b> ////////	<b>f</b>	
1777	~~~~~~~~~		WELL DATA
-7777	<b>/</b> ///////////////////////////////////		
-1////	<b>YYYYYYYY</b>	FILL	Hole Diam. 8 in.
- <b>I</b> MM	<b>/////////////////////////////////////</b>	ĺ	Boring Depth 30.0 ft.
. W	<b>~~~~~~~~</b>		Casing and Screen Diam.
3- <b>T</b> WM	<b>~~~~~~</b>		Screen Interval
444		i	Screen Type
			Stickup
527			Stickup
			Well Type
			Well Construction:
10-12-4			Filter Pack
-5.3	Sec. 3 10. 1		Seal
- FO	31.65	DARK GRAY SILTY CLAY	Grout
2-3	33.45A	Similar Grant	Lock No.
13≢			•
			TEST DATA
15-27-			
			Static Water Elev Date
	12022		Static Water Elev Date Slug Test Yes No
_ <b>▼</b> 14-23			Slug Test Yes No
			Test Date
4			Hydraulic Conductivity
20-			Other
		BROWN AND GRAY	
1			
-		VERY FINE SAND	WATER QUALITY
-			weign Accepti
25-			
			Samples Taken Yes No_X
7			No. of Samples Types of Samples
4			Types of Samples
₹			
4 .			
20			Date Sampled
			Samplers
			Samples Analyzed for
	,		
			Split Samples(soil)Yes X No
			Recipient Sverdrup, Inc. for Cerro
			Copper
			Comments Subsurface soil samples
			from boring 5 - 15' analysed for
			HSL compounds.
			<u> </u>
			REMARKS

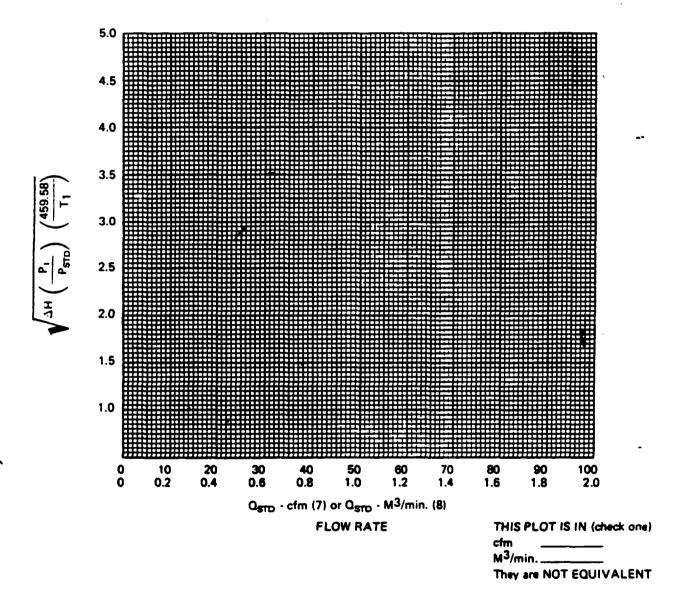
te Dead Creek Site-I	Boring/Well No. I-2 (cont.)
sple Depth Blow Count	Description
- 37.5 18-18-22 Same as above.	<del></del>
.5 - 40 11-24-37 Same as above.	
E.O.B @ 40'	
·	
•	

Site Dead Creek Site-I	Boring/Well Bo.	I_2
	por 1 mg/ mon 1 mo	

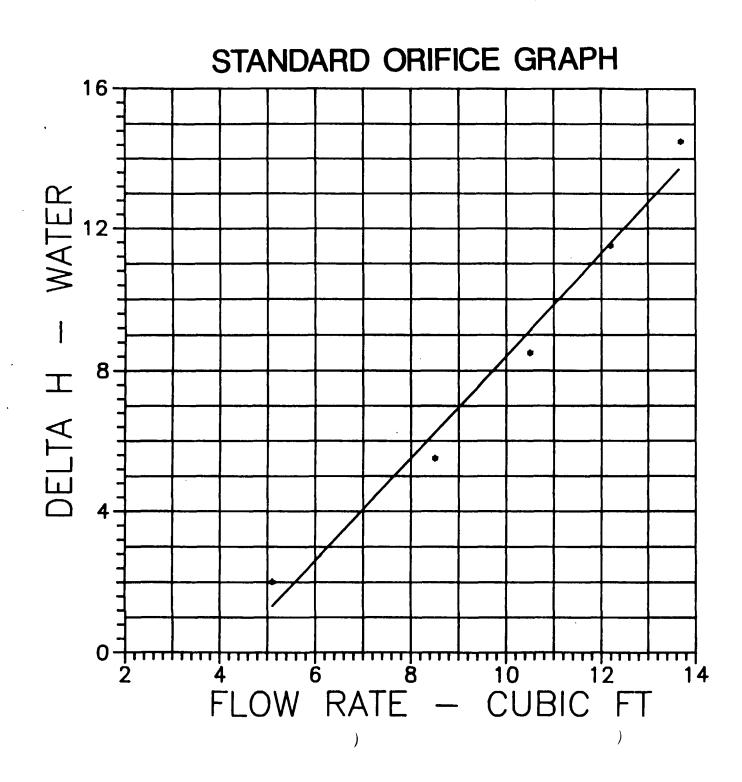
Sample Depth	Blow Count	Description
		Crushed limestone parking lot surface.
1 - 2.5	3-6-9	PILL consisting of black sandy CLAY including a mixture of fine-medium grain sand, asphalt, cinders, gravel, and slag. Dry.
3.5 - 5	1-1-2	FILL - same as above.
6 - 7.5	3-6-4	FILL consisting of black-brown silty CLAY. Trace of fine grain sand (in seams) 0 7'. Including some slag and wood particles. Dry.
8.5 - 10	3-2-2	WASTE consisting of light brown silty CLAY (to 9') including very loose black cinder material and medium grain sand. Dry.
11 - 12.5	51-11/1	WASTE - spoon refusal - probably a large obstruction in fill material. Wet.
13.5 - 15	2-2-2	WASTE consisting of black oily stained sludge-like material. Including fine to coarse grain sand, cinders, clay, and stained wood. Wet (with oily sheen).
16 - 17.5	16-7-6	WASTE. Same as above; with more wood particles.
18.5 - 20	0-1-2	WASTE - poor recovery - probably same material.
21 - 22.5	7-8-10	WASTE - same as above.
		Fill discontinues @ approx. 23.5'.
23.5 - 25	4-6-8	Black (stained) and gray SILT. Some very fine grain sand. Wet (with oily sheen).
26 - 27.5	2-3-2	Gray fine grain SAND. Some black staining. Wet.
28.5 - 30	9-7-3	Same as above.
31 - 32.5	11-11-11	Gray fine grain SAND. Interbedding of finer silty sand and coarser sand with small gravel; (approx. 4 inch layers). Wet.
33.5 - 35	5-10-12	Same as above.

#### CALIBRATOR ORIFICE STATIC PRESSURE $\Delta H \cdot \text{in. of H}_2\text{O (6)}$

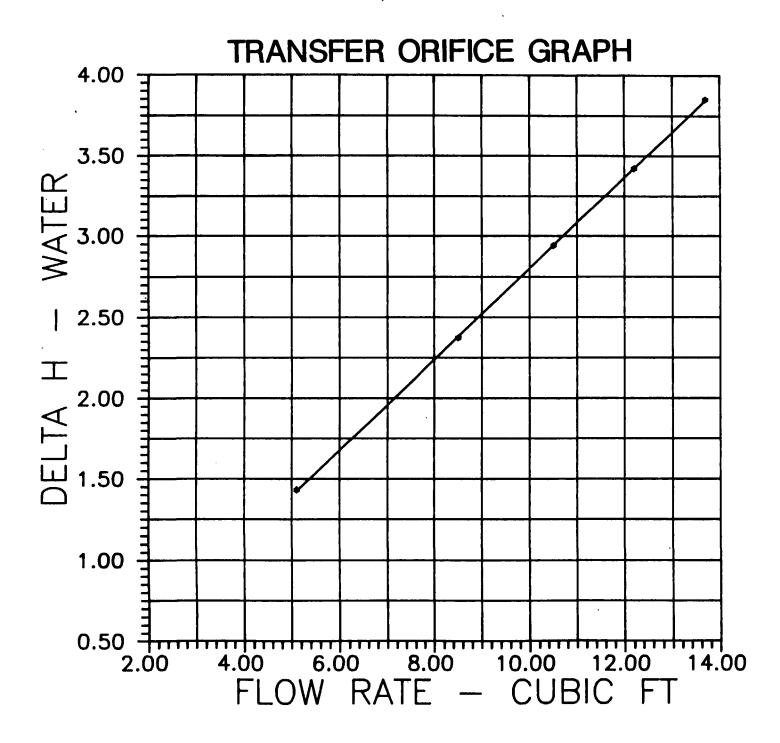




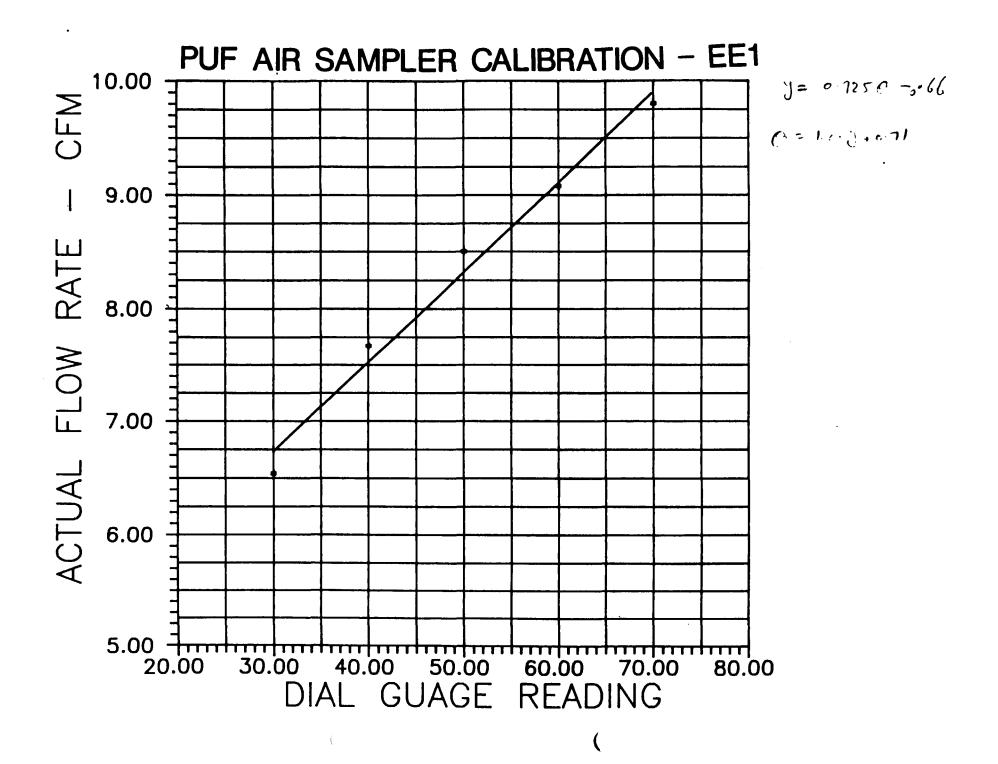
For application see ref. 1



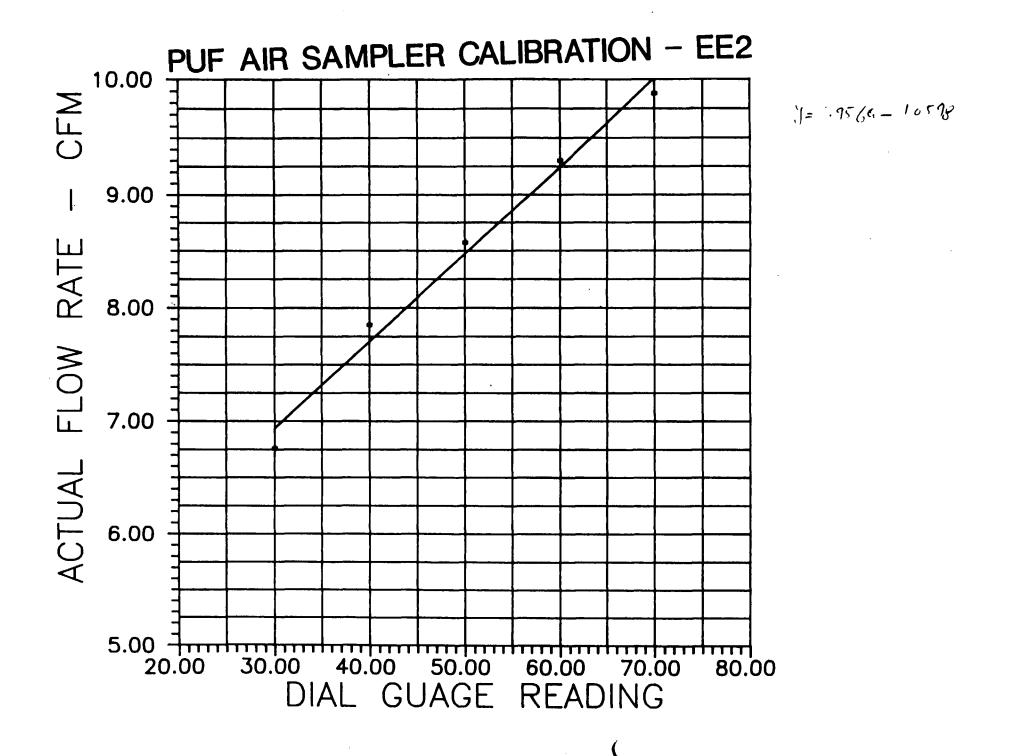
)



Name: A. Sew	• • •	Date: 7/15/47	7
Site Address:	DEAD CREEK - S	ire G	
PS-1 Shelter No.:	EE-1	Station Pressure	30.02
GMW Model 40 OCU	No.: 45-C	<del>-</del>	
Magnehelic Gauge-Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (OC)
70	3.7/3.6 NS.		64°F
60_	3.2/3/		
. <u>50</u>	2.8/2.7		
40	23/23		
30	1.7/1.6		
		·	
	<del></del>		
Comments:	ID SPERA 3 MAN		
<u></u>	RECTION 220° (	sw)	
	1: 73%	· · · · · · · · · · · · · · · · · · ·	
,	·		

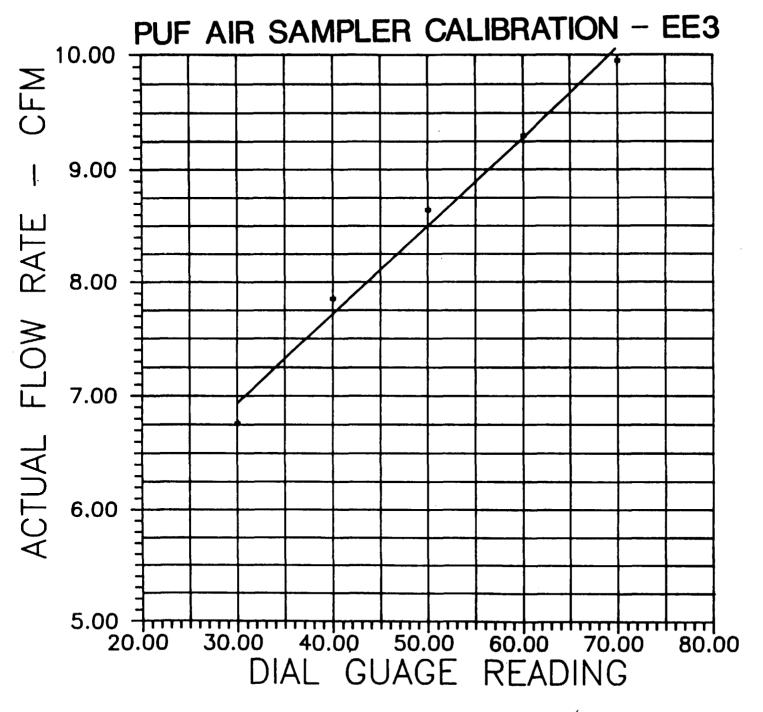


Name:	EWALL .	_ Date:	<u> </u>
Site Address:	NEAD CREEK -	SITEG	
PS-1 Shelter No	).: <u>F.E3</u>	Station Pressure	e: 30.02
GMW Model 40 00	CU No.: 45-C	<del>_</del>	
Magnehelic Gauge-Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (OC)
70	38/36		64 cx
60	34/32		••
	29/27		
40	2.4/2.3	-	11
30	1.8/17		
		<del></del>	
_			
Comments:	WIND SPEED &	mpit	<u> </u>
·	NRECTION 230	(sw)	
••			
		<del></del>	<del></del>



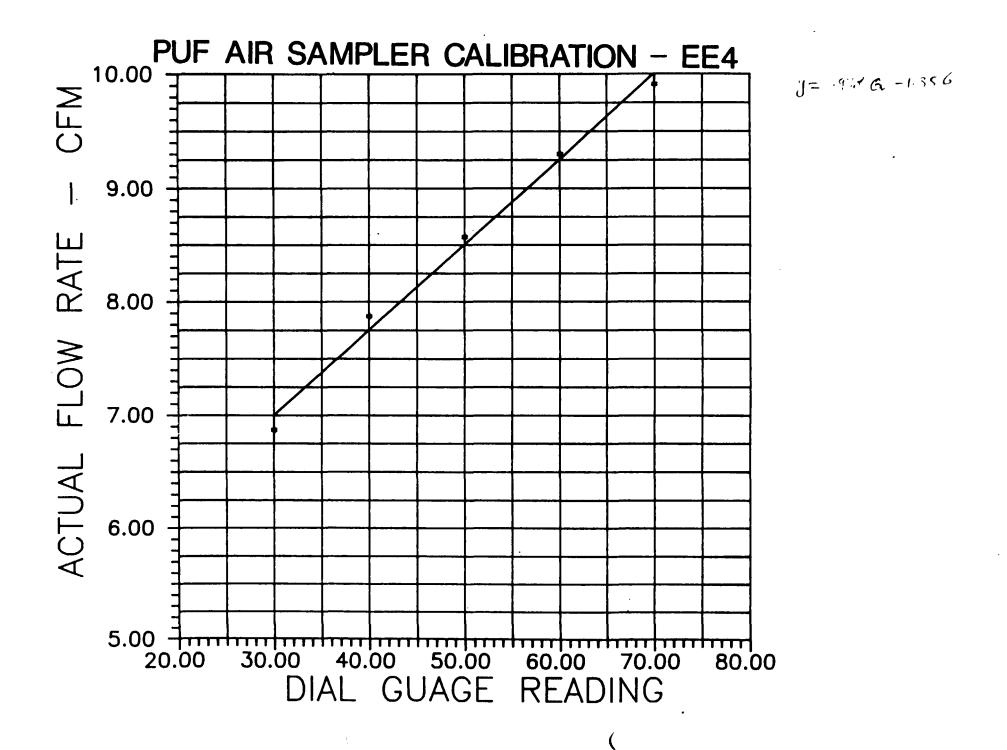
## Page: 5 of 7

Name:	stware.	Date: 7/15/	<u> </u>
Site Address:_	NEAD CREEK . SI	The G	
PS-1 Shelter No	).: <u> </u>	Station Pressure	: <u>30.02</u>
GMW Model 40°00	CU No.: 45-C		
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (OC)
70	38/37		64°F
60	34/32		.1
	2.9/28		. (
40	2.4/2.3		<u> </u>
30	1.8/1.7		
	<del></del>	·	
· · · · · · · · · · · · · · · · · · ·			
Comments:		<b>8</b> .4	
	WIND SPEED & MI		



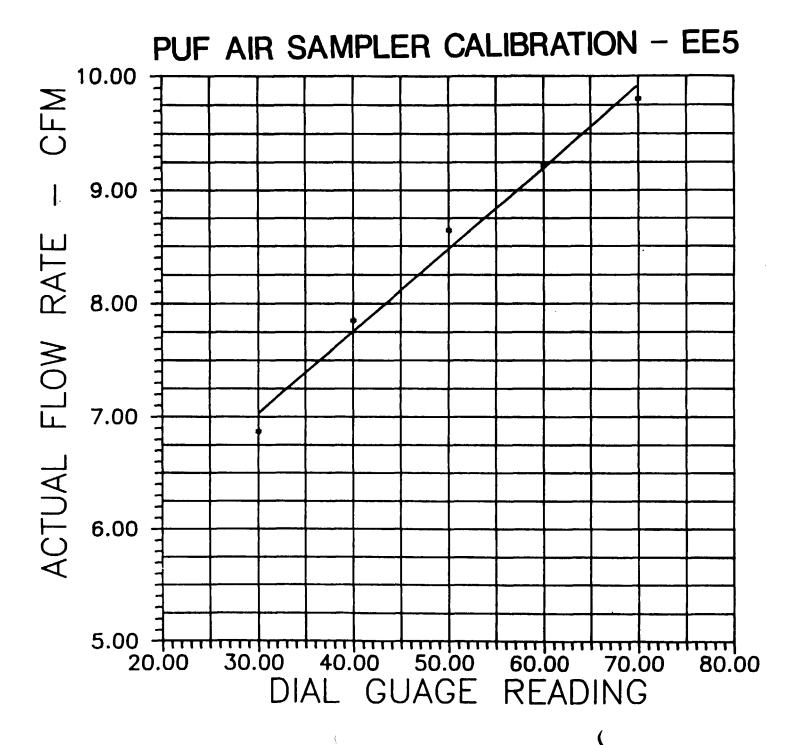
1= .. 18: 9 - 0.73

Name:	A. SEWA	·	Date:	7/15/57	
Site Addı	ress:	CAN CREEK	- Sire G	·	
PS-1 Shel	lter No.:	EE.4	Station	Pressure:	30.02
GMW Model	L 40 OCU No.	: 45-C			
	•		•		
Magnehel Gauge - Rea		Manometer		Flow- (tcfm)	Temp. (OC)
70´		7167 62 W	O) . Vace	(CCIM)	
,					<u>64°F</u>
_60_	•	33/33		<del></del>	10
. <u>50</u>		2.8/2.8			:/
<u> 40</u>		2.3/2.4		·	11
30_		1.8/1.8			·
			<del></del>	<del></del>	<del></del>
			·	·	
	<del></del>				
Comments:			man		
	A.R	GETION 370	2° (Su)	· .	
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•	T.				•
	A				
•	G	•			
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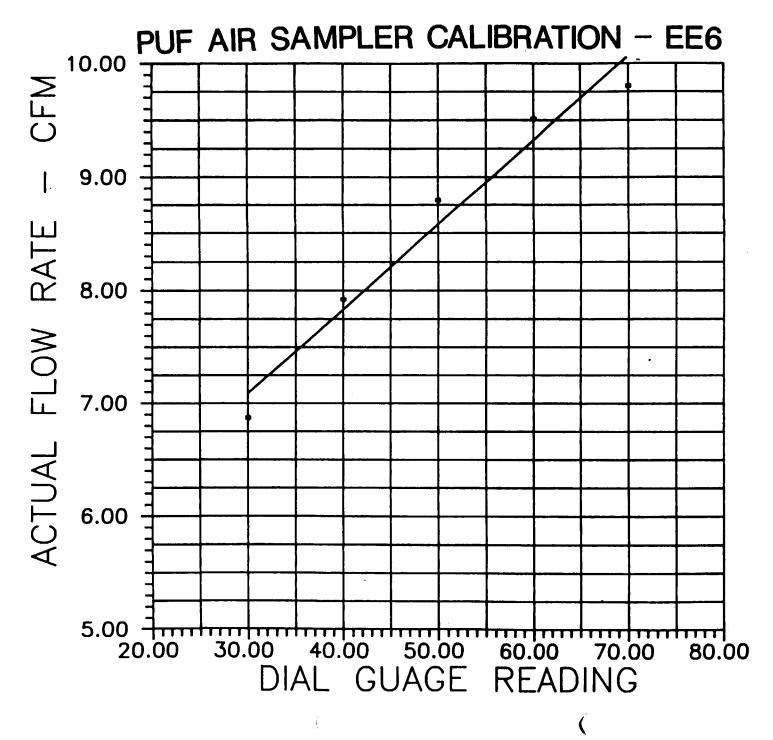


Page: 5 of 7

Name:	stwall .	Date: 7/15/47	
Site Address:_	ARAN CREEK - SU	-6-6	
PS-1 Shelter N	10.: <u>FE-5</u>	Station Pressure:	30.02
GMW Model 40°O	CU No.: 45-C	<del>_</del>	
Magnehelic Gauge-Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C) -
	37/36		644
60	3.3/32		
	2.9/2.8		••
40	2.4/2.3	•	· ·
<u>-36</u>	1.5/1.8	. ———	•
	<del></del>	·	
		-	<del></del>
Comments:	WIND SAERA & MON		
•	ARECTON 320° (	(sw)	<del></del>
<del></del>			
	·		·



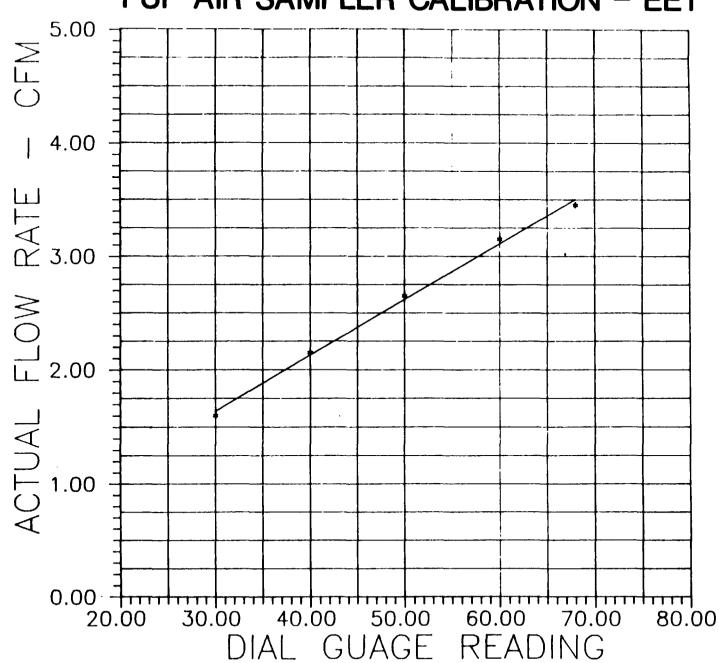
Name: A. SEWALL .		Date: 7/15/87		
	SEAN CREEK -			
PS-1 Shelter 1	No.: <u>FE 6</u>	Station Pressure:	30.02	
GMW Model 40°C	OCU No.: 45-C	<del></del>		
	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C) -	
76.68	3.7/3.6	<u> </u>	64 %	
_60_	35/3.4		··	
50	3.0/2.9		. '	
40	2.4/2:4 56	·		
36	1.5/1.8 5.4	<del></del>	···	
		·		
<del></del>	<del></del>		<del></del>	
Comments:	WIND SPEED &	1Pit	<u>·</u>	
-	AIRACTION 220°	(Sw)		
			<del> </del>	
			·	



wind 210° 9 mpd

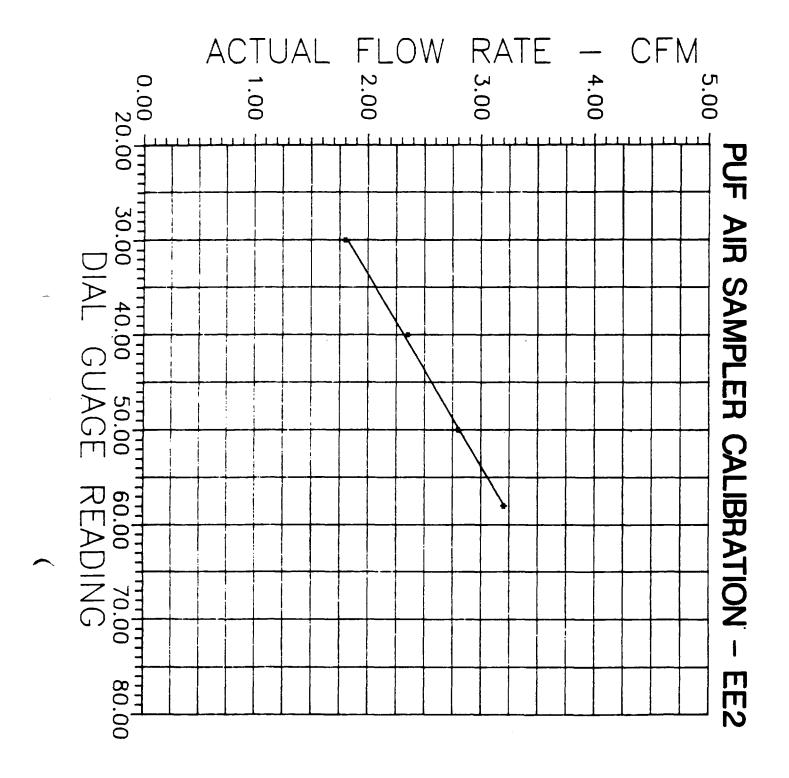
Name:	wall.	Date: 7/2	0/87
Site Address:	ALM CREEK -	SITE O/R	
PS-1 Shelter No.	:E/	Station Press	ure: <u>30.2/=</u>
GMW Model 40 OCU	No.: 45-C	<del></del>	
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm	_
78	35/3-T 35/3	.+	
_60_	32/3./		
<u> 50</u>	27/2.6		
	3.2/2.1		
30	1.6/1.6	<del></del>	
<del></del>	·	·	
Comments:			
			•

PUF AIR SAMPLER CALIBRATION - EE1

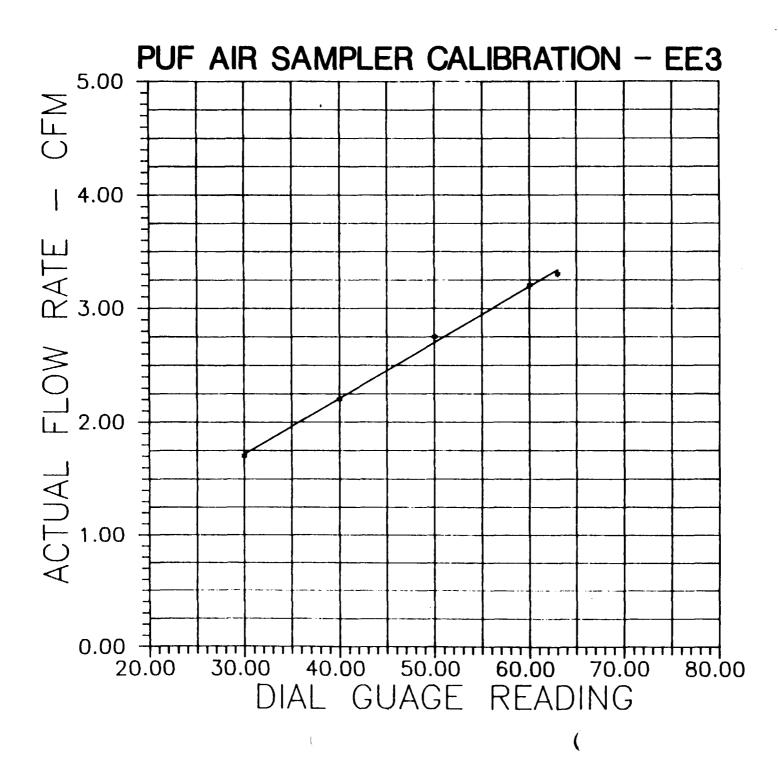


Page: 5 of 7

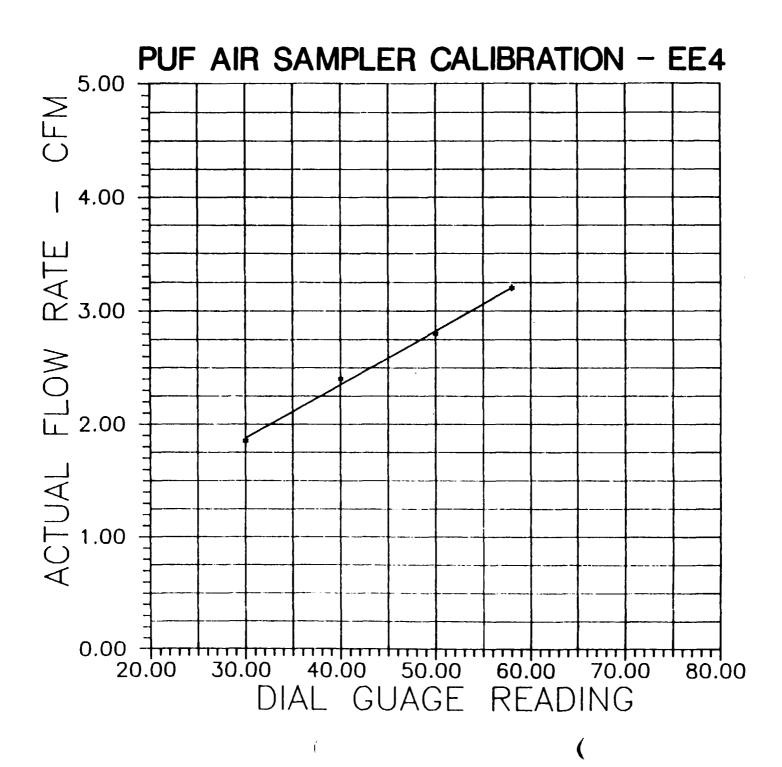
Name: <u>A SEWALL</u> Date: 7/20/87					
Site Addres	5 <b>5:</b>	AN CREEK -	SITE O/R		
PS-1 Shelte	er No.:	E1:2	Station Pressure	30.2/	
GMW Model	ocu no.	45-C			
Magnehelio Gauge-Readi		Manometer ling (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C) -	
	•			89°F	
<del></del>	<u>-</u>	3.2/3.2			
	•	28/2.8			
40	-	2.4/2.3			
30	-	1.8/1.8			
	<b>-</b>				
	-			<del></del>	
		•			
Comments:		•	·	<u> </u>	
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	<del>-</del>		<del></del>	· · · · · · · · · · · · · · · · · · ·	



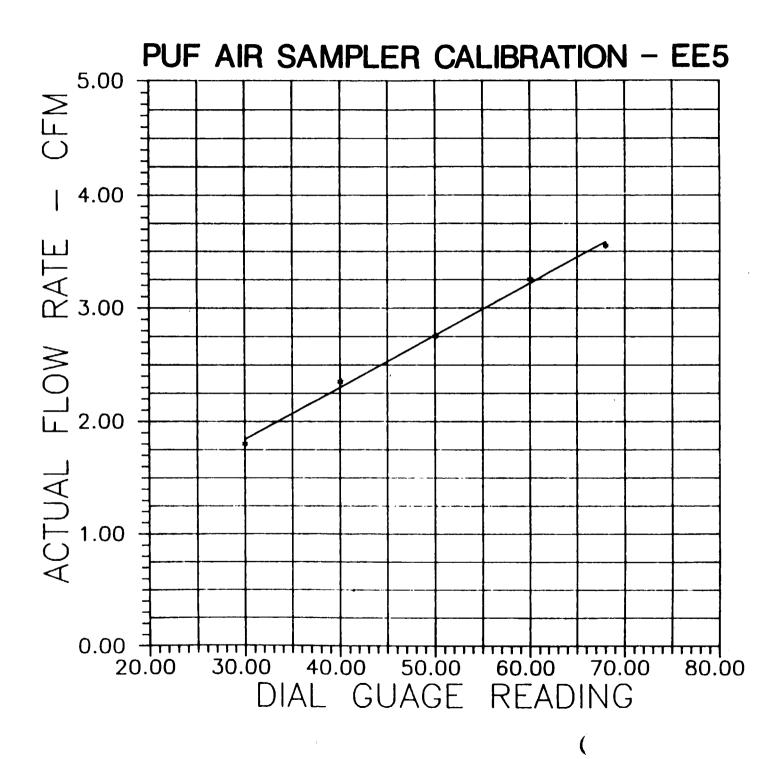
Name: A SEWALL .		Date: 7/20/87						
Site Address:_	NEAS CREEK	- circ Q/R						
PS-1 Shelter No	0.: <u>£4-3</u>	Station Pressure	30.2/					
GMW Model 40°00	CU No.: 45-C							
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (OC) -					
<u>- 63</u>	3.3/33		<u>89°</u> F					
_60_	3.3/3.2							
50	2.2/2.7							
40	22/2:2	<u> </u>						
30	17/17							
<del></del>	<del></del>	·						
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Comments:			<u> </u>					
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			. —					



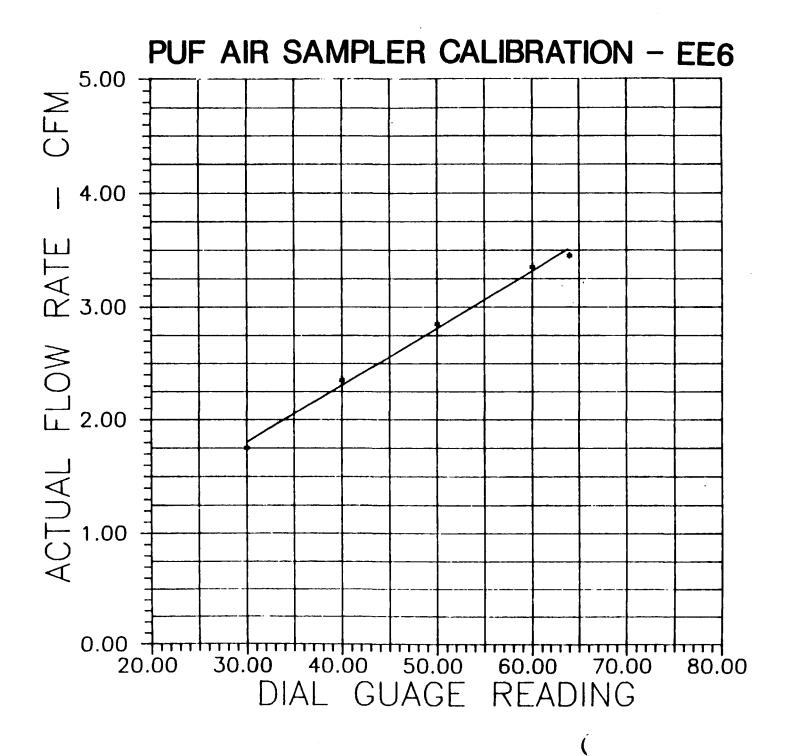
Name:	1. SEWALL .	_ Date:	<u>87</u>
Site Address:_	MERO CREEK	- SITE Q/R	
PS-1 Shelter N	0.: <u>EE-Y</u>	Station Pressure	: 30.8/
GMW Model 40°0	CU No.: 45-C		
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (OC)
58	- 1/2/		89°F
<del>60</del>	<u>33/3/</u> <u>29/27</u>		
<u> 40</u>	<u>21/2.3</u>	<del></del>	<del></del>
<u> 30</u>		· · · · · · · · · · · · · · · · · · ·	
	<del></del>		<del></del>
Comments:			<u> </u>
-			
· · · · · ·			<del></del>



Name:	SEWALL .	Date: 7/x	187
Site Address:_	ALAS CREEK	SITE O/R	
PS-1 Shelter No	o.:	Station Pressur	e: <u>30.2/</u>
GMW Model 40 0	CU No.: 45-C		
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. ( <sup>O</sup> C) -
<u> 63</u>	36/35		89°F
	3.3/3.2		
<u> </u>	2.8/2.7		
<u>~</u> 5	2.4/2.3		
35	1.8/1.8		
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Comments:			
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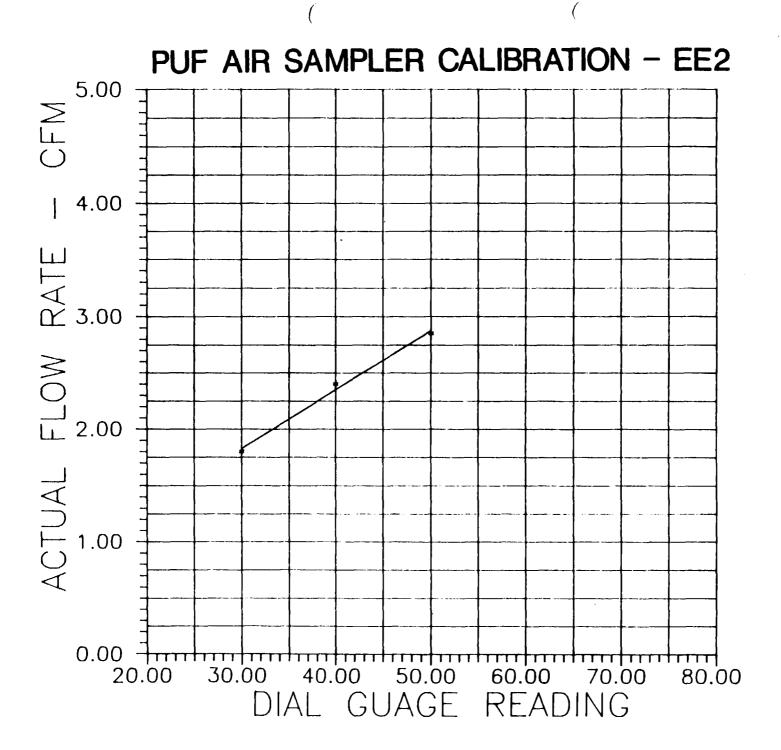


Name:	SEWALL .	Date: 7/20/3	7
Site Address:	NEAD CREEK	SITE Q/R	
PS-1 Shelter No	·:	Station Pressure:	30.21
GMW Model 40° OC	U No.: 45-0	_	
		•	
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (OC) -
_64	35/34		29°F
_ 60	3.4/3.3		
50	2.9/2.8		
	24/23		<del></del>
30	1.8/1.7		
		•	
. Comments:			
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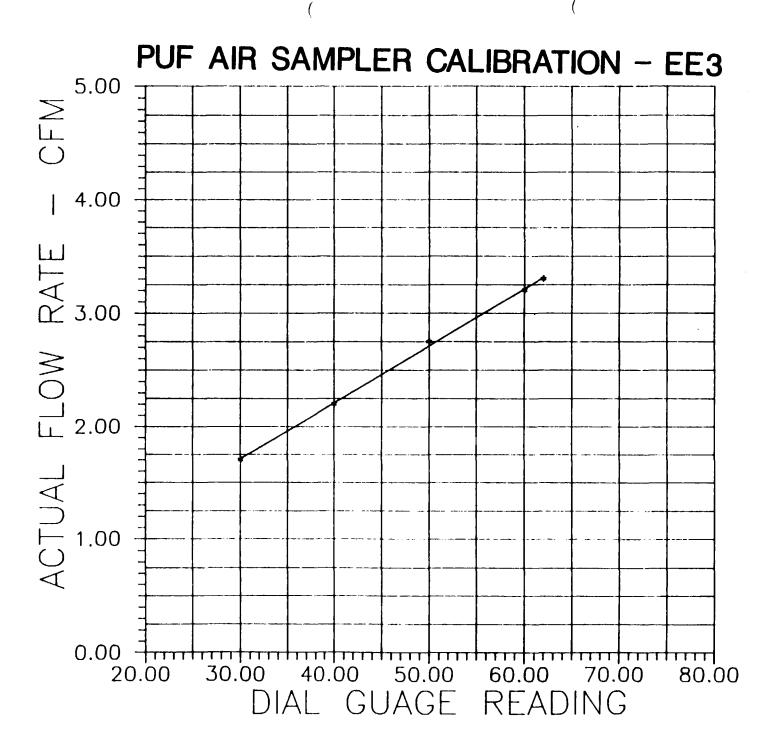


Name: 1 32w.	pu ·	ate: 7/22	187
Site Address:	DEAD CREEK - SI	TAS O/R	
PS-1 Shelter No.	: S	Station Pressure	:
GMW Model 40 OCU	No.: 45-C		
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C)
*			
<del></del>			
		•	
<del></del>		•	<del></del>
Comments: *	O FULL CALIBRATIC	ON FOR FF-1	Aut FO
	TOR FAILURE.	<u> </u>	
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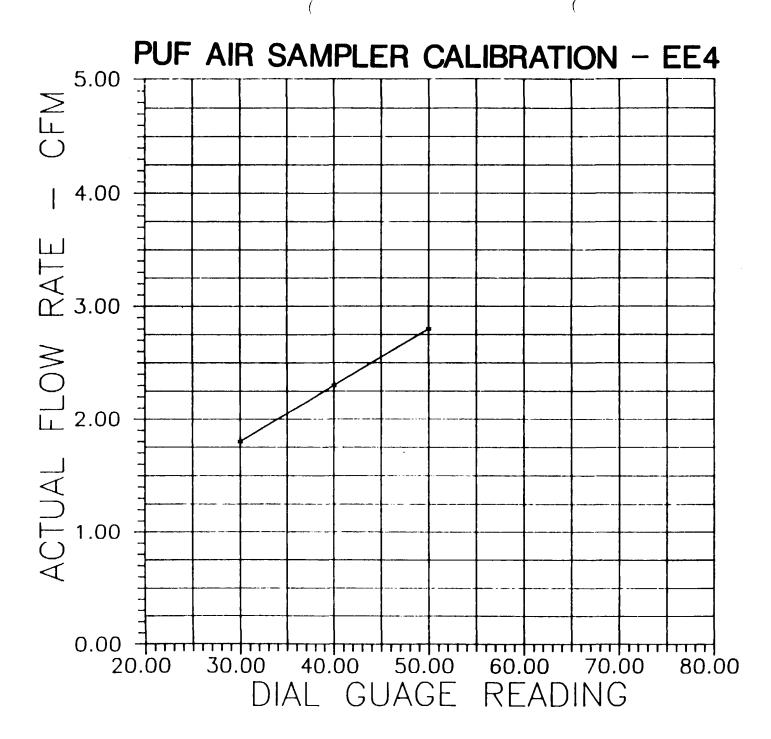
Name:	sewall . I	Date: 7/2:	187
Site Address:_	NEAD CREAK. 51	ms ole	<del></del>
PS-1 Shelter No	o.: <u>FA-2</u> S	Station Pressure	30.10
GMW Model 40 O	CU No.: 45-C	<b>-</b>	
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O) -	OCU Flow- Rate (tcfm)	Temp. (OC)
_50_	2.9/2.8		<u>86°</u>
40	2.4/2.4		
30	1.8/1.8	i	
	· · · · · · · · · · · · · · · · · · ·	-	
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			<del></del>
Comments:	PUGE READING SO AF	START OF THIS	0171
	LUE OREN.		
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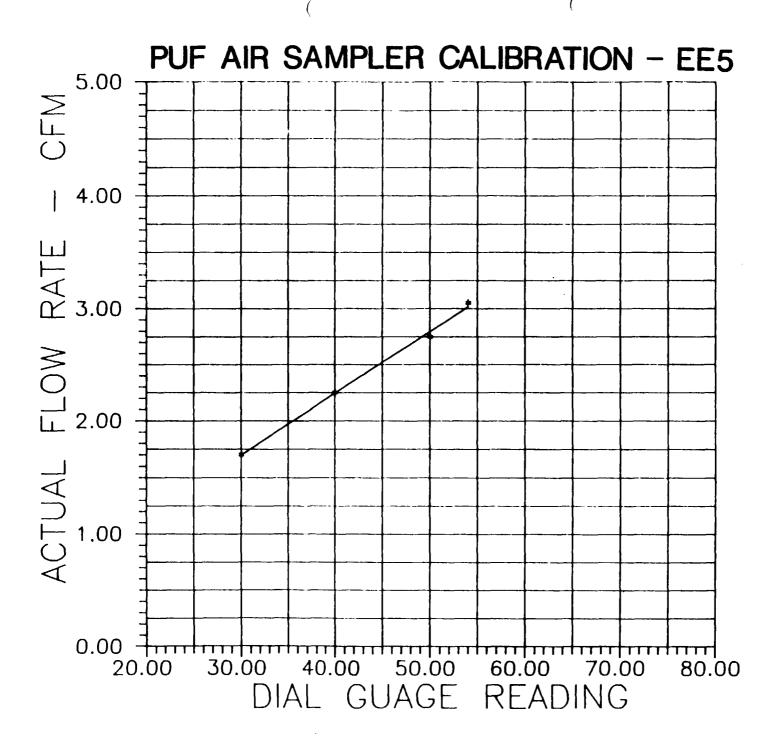
Name: 1. SEu	1966	Date: 7/22/	87
Site Address:	ARAA CRAKK	· SIFES O/R	
PS-1 Shelter No	).:	Station Pressure:	30.10
GMW Model 40 OC	CU No.: 45-C	<del></del>	
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C) -
	32/33		86
60	22/3.2		
	<u> </u>		
40	2.3/2:2	·	
<u> 30</u>	1.7/1.7		
		•	<del></del>
Comments:		· · · · · · · · · · · · · · · · · · ·	
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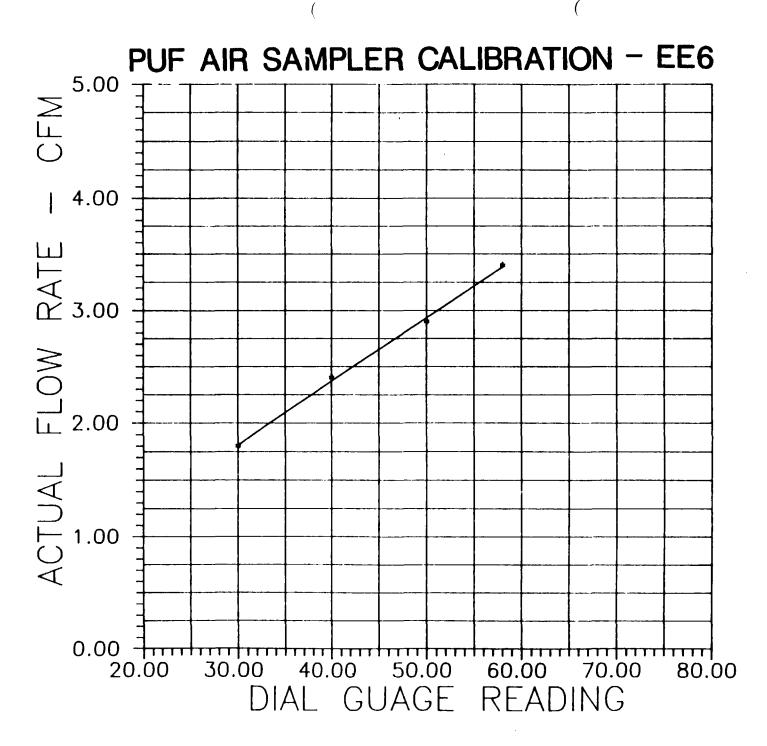
Name:	S. SAWALL .	Date:/22/	R
Site Address:	ARM CRARK	- SIFES O/R	
PS-1 Shelter 1	No.: <u>FR-4</u>	Station Pressure:	30.10
GMW Model 40°C	OCU No.: 45-C	_	
Magnehelic Gauge Reading	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C)
_్రెం	3.8/2.8		<u>86°</u>
<u> 40</u>	2.3/2.3		
	1.8/18	·	
	· .	*	
	<del></del>		
	<del></del>	•	<del></del>
Comments:			
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			<del></del>
	·		



Name:	1. SEWALL .	Date: 7/22	/87
Site Address:	DEAD CREEK	- SITES OFR	
PS-1 Shelter No	.: <u>Ek-5</u>	Station Pressure	30:/0
GMW Model 40 00	CU No.: 45-C	_	
Magnehelic Gauge -Reading-	Manometer Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. ( <sup>O</sup> C) -
_54	30/31		86
_50_	2.8/2.7		
40	23/22		<del></del>
30	_1.7/1.7		
	<del></del> .		
<del></del>	<del></del>	·	
	<del></del>		
Comments:			



Name:	D. Stwall .	Date: 7/22/	87
Site Address	S: AEAA CREEK	- SITES O/R	<u> </u>
	r No.: <u>EE-6</u>		
GMW Model 4	0 ocu no.: 45-c	<b>→</b>	
Magnehelic Gauge Readin	Manometer ng Reading (in. H <sub>2</sub> O)	OCU Flow- Rate (tcfm)	Temp. (°C)
38	34/31		<u>86°</u>
_56_	29/29		
<u> 40</u>	2.4/2.4		
_30	1.8/1.8		
	<del></del>		
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	<del></del>		
Comments:			
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# High Volume Sampler Air Volume Calculations

Summery Data

, ()	0c-27 % 1x-22 1x-23 1x-24 0c-24 0c-25 0c-25	DC-200/P DC-15 / DC-14 / DC-17 /	0c-12 / 0c-13 / 0c-13 / 0c-8 /	Site 00-01 C 00-02 // 00-03 // 00-05 // 00-06 // 00-07
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	EE-6 EE-6 EE-6 EE-6 EE-6 EE-6 EE-6 EE-6	EE-7 EE-7 EE-7	2-2-7 1-1-2 1-1-5 1-1-5 1-1-1-1	BEE-4  BEE-4  BEE-5  BEE-5  BEE-6
Indical. Co	7-22-87	7-21-87	7-17-87	7-16-87
- 1 8 2 0 A++	- ±D 622 -742.2 -621.9 -722.1	714.4 566.5 721.9 916.6	621.5 719.3 740.2 740.7 733.5 556.6	5-96-17 
H+ P144 + 0.0156		4055 3048 -3668 -2959 -4135	3160 3794 3531 4019 3671 2899	7.7. A. A. C
	92.48	115.53 86.84 104.50 84.30	90.03 108.09 100.60 114.50 104.59 82.59	113.05 102.57 102.57 114.44 102.47

Samples	Sampling (, castles		PUF Can. Vanes	Vertes		Clock Time			Sampler Times	•	Vanturi Resdings - Time/Regnativity in HyO Te		Ami Tompus	**************************************	Present	men Hig	Commons		
\$/N	) D.	Parent (J)	Ma.	Sening	Start, by COT	Step, Nr CDT	Min Elepand	Stort, mm	Step, mm	Min Elepsed	3,700	190	1450	•	Burt	5100	Stort	\$100	
6-1	at colate	~			0600	1837	<b>ッィフ</b>	812.3	14338	21.5	53	93	3.2	33	69	85	30.14	30.10	10-18 AC-10
	E- OC FENCE				06/0	1811	731	728.9	14483	7/9.3	44	37	34	34					AC-08
<i>6</i> .3	NE (CECRO)	~			0608	1832	70101	7403	14804	740.2	38	30	<i>3</i> 8_						AC-09
4	NW CORNER	•					750	118.3	15190	740.7	47	37	.76						DC-13 (NOCTOR
65	Sw.RKG	<u> </u>			0553				14/23										AC-1A
<i>£</i> -6	alt CORMAN				0603	<b>∠83</b> 5	756	678.9	12355	556.6	<i>4</i> ℃	36	34	32	67	<u>85</u>	30,14	<u>3</u> ₹7/0	AC-II (CO LECAIAL
						_													
	WERTHER	. H	104 -	STAR	7:	WMA	SE (	40°	B MPH	69°F	30,	14.	N.W	ez.	5	<b>Ø</b> 7	202		
		<b></b>		2100		week.		80.17	8 most	, 80°F	30.	ø	700	6)					- :: <u>-</u>
				STOP	·	WIND	SPE CI	(B)	3 MPH	857	<del>, 3</del> ¢	.70	sew.	7.70	( =	640			
		40-	V0/-:	STA	RT -	سارمها	/ ندي	(90°)	IOMA	76°F	30.	10	709	<b>20</b> )					
				MI	N/	4444	دروي	(1900)	10000	840/	. 30	14	1/2	40					
				.5 <i>T</i> 9	··· -	m/~V	5 (	30^)	13 000	, 48°/	<b>, .3</b> 0	40	111	30)	New	PŢ	19		
								<u> </u>			<u> </u>								

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

MEND CREEK SITES Q/R

7/2/87

Porture to SEWALL

سنيسا	Serveting Common	Mas	PUF Con.	Vertex		Chesh Time		l	Sampler Timer			the state of the		Ne In. HyD	Tompo	me of	Baramatria Frazzara imm Ma		Commons	
8/4	10.	Pan- (√)	**	Bossing	Sep1, to CST	9100, N- CO1	Min Stagend	Stert, min	Step, min	Mar Playment	\$70,27	10,20	19,0	•	8001	Prop	Store	5100		
5/2-1	S. ARTION				0.702	1994	722	14258	21502	714.4	56	16	46	44	23	87	30:23	3011	AC -20	
(1.2	an PORTION	•			0633	1920	767	14512	2017.7	446.5	46	40	36	34	23	£.7	30.12	3017	AC-15	
6.3	ME ORNER	٠,٠			9627	1834	727	1486.7	2208.6	721.9	42	35	33	36	23	87	ورع	30:17	AC-16	
2.4	NW PORTION	/			0632	1918	766	531.5	2088	566.5	46	36	32	32	23	87	20.23	30.17	AC-17 CO-LOCATES	
6-5	TO SERVE				0640	19.44	729	1420.2	2330 8	910.6	4	40	40	41	73	87	20.2	30./7	14.19	
1.6	W BKB	y.			0654	1711	737	12376	1949.0	711.4	44	10	34	34	73	87	30,0	30./7	DC-14	
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							MASLE		W, NA	Sw (	200	8	PI	RL.	× 3	34	7,	40		
							LVA			SW C										
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						-	المراح ديو	STA	Ŗ <u></u>	21.0/1	56 /	1,40	Smer	- 00	1%	10	25	023	7	
								0/4	11:-	14/A/A	Su)	200	0	0.0	26.	~	2/	1,00	7.	
								ENA		~A 5	7,0	<u> </u>	1 000		00.	7 2/	1.77	173	*	
								72.46	- K	(251 - 2	1.44	<del>                                     </del>	1	<del></del>	<del>7</del> 0-7		<del>[''/</del>	1	<del>  /                                   </del>	
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Opts Charlest By \_\_\_\_\_\_\_ Cree \_\_\_\_\_

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

CEMERATORY ON EK-5 BROWN DOWN 5 MIN.

AFTER START UP (FLOW CHANDE), REPLACED

CHIMATOR

**A.** 

FAULT ON LOW LOL RIMP (JAK 4 AT 10,20 AM)

The Carrie

	Sampling (, assisso		PUF Care.	Vertex	Clash Time		Sample: Timer		•	Verturi Randwys - Time/Magnetici		-Mayeratoriu in 1170		Tompon	nome it	Baramania Prasura mm Ha		Canama	
\$/NI	<b>,</b> • • • •	P#= (√)	No.	Berring	9w1, to C97	Step. to COT	Min Planted	Stort, mm	Step, min	Min Plant	•	1300	1566	•	Stort	9100	Stort	5100	
/- ځ	4 Berns				0627		_			154.6*			المين						AL - 27 MOTHE BOEA
-2	NU CORTION		ļ		9608					622				36	74	84	10.21	30.1d	N-32
<u>. 3</u>	ar colock	_	<b></b>			857													c.03
4-4	NW METON				1407		786	2089./	*7//	621.9	32	24	24	28	74	86	2:2L	30.10	N-24 50 4051711
<u>''''</u>	Su Verilage	~																	Ac . 26
16	Sw MAKKE	<u> </u>			0621	1E41	740	1948.2	X83.7	735	46	35	34	35	24	86	30.2l	30.10	10c 25
عسر								<u> </u>				<u> </u>				L	<u> </u>		10 - 25
			<b>.</b>	<u> </u>				<u> </u>		<u> </u>	<u> </u>	1				L			<u> </u>
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				L	WEAT	W-R	Al Vo	4 570	RT.	MANA	عدا	1000	6.	nex_	74	74.	Bo.2	V (c	230
				I					V.A -	WIND	SE C	/00°	A	9,1	90	F 3	5.17	7/3	10
									a -	میرین									,
				ļ —					i T	1							1		

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

8600 WIND NE 8-5

A MOTOR ON RE-1 WENT DOWN Q N 9:00 A.M. FUR AN UNKNOWN REASON!

ARMETURE TEETH & BRUSHES BROKEN - NOT PEPAIRABLE AT THIS TIME

TOTAL SAMPLE TIME AT LE-1 1546 MIN.

$$V_{S+d} = V_{m} * \frac{P_{i} - \Delta P}{P_{S+D}} * \frac{\left(T_{S+D+4(0)}\right)}{\left(T_{i} + 460\right)} \begin{cases} T_{S+D} = 77^{\circ} P_{S+D} \\ T_{i} = 64 \end{cases}$$

$$\begin{cases} P_{S+D} = 29.92 \end{cases}$$

$$G_{std} = \frac{V_{std}}{T_{ine}}$$

$$Q \text{ stD} = \frac{3.53 + 29.76 - 0.2}{29.72} + 1.025 = .5.11 cm$$

Ost 
$$\frac{3}{3}$$
 =  $\frac{35.3}{3356}$  =  $\frac{29.76 - 0.6}{29.92}$  = 10.50 cfm

Ost 
$$4 = \frac{35.3}{2.865} + \frac{27.76 - 0.8}{27.92} + 1.025 = 12.22 cfm$$

Ost 5 = 
$$\frac{35.3}{2.538} + \frac{29.76 - 1}{29.92} + 1.025 = 13.70 cfm$$

$$\sqrt{\Delta H \left(\frac{P_1}{PSTO}\right) \left(\frac{T_{STO}}{T_1}\right)} = \sqrt{\Delta H} * \sqrt{\frac{29.76}{27.92} * \frac{537}{524}} = \sqrt{\Delta H^{+} 1.0096}$$

$$\Delta H_{1} = \sqrt{2} + 1.0096 = 1.428$$

$$\Delta H_{2} = \sqrt{5.5} + 1.0096 = 2.367$$

$$\Delta H_{3} = \sqrt{8.5} + 1.0096 = 2.943$$

$$\Delta H_{4} = \sqrt{11.5} + 1.0096 = 3.424$$

$$\Delta H_{5} = \sqrt{14.5} + 1.0096 = 3.844$$

Table of Calibration of Morometes (Tourital OH)

Werner 
$$G_{SH}$$

1.428

2.367

8.498

2.943

10.50

3.424

12.22

3.844

15.70

Linear Regions 
$$y = mz + b$$
 $m = .28$ 
 $b = -.0156$ 
 $cc = 0.997$ 
 $z = y + .0156$ 
 $cc = 0.28$ 
 (1) 
$$T = 460 + 89 = 549, T_{S+d} = 537$$

$$P = 30.21 \text{ in}$$

$$P_{S+d} = 29.92$$

$$P_{S+d} = T_{S+d} = 30.21 \text{ sage} = .994$$

$$V_{S+d} = T_{S+d} = \sqrt{2.9.92} \text{ sage} = .994$$

$$V_{S+d} = \sqrt{M_{S+d}} = \sqrt{M_{S$$

ور ماند

edeath i (E) (S) (S) 5.495 8.4.5 9.4.9 De folketie: 7-27-87

Talkofalentur of plurate (0)

= E-2

sit 0/R | means ms+1 (1) Consected an 8227 1.524 1.663 ora domilia fals in No (OH) 3.2 2.4/2.3 2.8 (x) std (x) std 7.57 7.03 5.44 6.59 myn kki. 8 40 30 E E-2

4.816

1.333

ScarctoH= (04. P. Tit = JOH + 0.994 7 = 537 841 = 59.92 MS+2= (m +.994 120 549 | A= 30.21

(2) ( G= 1- [ Jamestron + .0156] Y=0.74 X +809 cc = 0.999

```
Table of Coll braham of flow sate (6) | wersus Ms+1
                M (1) monometer (AH)

std Rending (in. H20)
magnetalic'
               (X)
                       3.3/3.3
                                             1.86
                                                              6.506
              7.89
                        3.2/3.2
                                                              6.406
                                              1.778
              7.70
                                             1.648
      50 7.03 2.8/2.7
                                                               5.941
                         2.2/2.2
                                                                5.32
                                              1.474
      30
                                                                 4.684
                                             1.296
```

(1) 
$$T = 460 + 89 = 549$$
,  $T_{SHJ} = 537$ 
 $P = 30.21$  in

 $P_{SHJ} = 29.92$ 
 $P_{SHJ} = T_{SHJ} = \frac{30.21}{29.92} = \frac{537}{549} = ...994$ 
 $P_{SHJ} = \frac{7}{1.} = \frac{30.21}{29.92} = \frac{537}{549} = ...994$ 
 $P_{SHJ} = \frac{7}{1.} = \frac{7}{$ 

1./0

1.5241

1.333

5.498

4.816

40 6.286

Y=0.689 X+ 1.10

cr = 0.999

5.44

1.8/1.8

Statistical environments

creak #1 by mc 10-20-87 \$ | \$ | \$

	23	16:45	14:30	702	3. 1	
	ā		, c	2 4 9	(min) - (min)	
	 V	, <u>, , , , , , , , , , , , , , , , , , </u>	110			
	7	42	4+	42	Magnetale Rady (m)	
	6.46	(.2)	6.43	6.56	K\$+)	
<b>S</b>	6.48	6.47	6.50	I	(1) AJ. Std Mstd (X)	
. (	- 2. <del>1</del>	2 40	2 7 5 2 7 5		ArJ.a.	
33.68	7.00	723	240/		Are tolor	

to the Ari vol. C.A.

= 1.012

30-05 + 537

m + Comita Act

The section of the se

C62- 43.03.537 = .997

(2) Y = 0.733x+ 0.658

20 30 4 1 C = Elph Tro

ecology and environment

Arga An value	2077	635	988	
17.9	5.09	5.04	8.09	
M.J. Ms+1. (x)	5.79	2.72	5.79	
(c) (48)	5.30		2.77	o V
Magnetile (1)	1 c	7	ν .	70
Canal Canal	700	971	47.1	
Time Elepe Time (min) (min)	436	+37	981	
1 ms (min)	7	00:1	\frac{\frac{1}{3}}{5}	19:51

To TID Air 101. 3598 64

J Y - 0.74 X + 0.809

?) Air solve = O \* Elpre The

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	01 +	08:41
31-9 01.5 86.5	181	-
781 d30	اطك	55:91
86.5 98		200
798E T.C.D.		

L8/91/L E-3

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= + 43.035€.

ecology and environmen-

	- Are volum	(2) (1)	(x) 145W	(1)	Magnelaki Rading (M)	(4960)	- Ebpe Tive -	(min)
	6355	9 + 5	9 3 ک	04.9	04	2 £ 4	284	81:4
		. •		11.9	TE	· · · · · · · · · · · · · · · · · ·		08:41
	42L	98.5	· 11·9	11.9	<u> </u>		اعک	54:91
	456	Le·s	۶ <i>۱:9</i>	51.9	g E		461	68:61
	L104	10,000	<u>u</u>					
#1	. <sub>4</sub> 2							

L8/91/L 7-3=

EE-5 7/16/87

проинольна рив стопо ог

(Min.)	Elophe Time	Correct J	Magnetalic Rosing (M)	(1) N <sub>S+J</sub>	A~J Ms+J. (X )		(9) Anvolume
7:22			40	640	6.26	· <b>-</b> · ·	_
14:30	428	373	37	- 		5.41	2018
·	135-		· · · · · · · · · · · · · · · · · · ·		6.06	5.27	617
16:45	205	178	36	6.02	6.12	<b>5</b> ⋅32	947
~ 10			39	6.23		_	
			•		Total	pi vot.	3582 af

3) Air volume = @ \* Elapse Time

15.7 G	7/16/87					
	Cart	month.	3	Av7	ACS (2)	Am latore
(Min) (Min)	(man)	But y (m)	M <sub>S+</sub>	$M_{s+1}(x)$	,	
704		36	16.0.7			
446	-392	• • •	0	5.96	5.19	2054
4:50 3-5	# 4		)	28	<i>S</i>	1209
16:45		33	5.77	010	ò	7/3
19:25	-	34	50			2357
			,	13 12	TO THE pair vol.	(

2) Y= 0.761 x+ 0.659 (1)
Sty = 1 m + Cometon forton
Sty = 1 m + Cometon forton

Sty = 1 m + Cometon forton

C62 = 1.007 C62 = 1.007

Air volume = G + Elype Time

7-17-87	
1-3	なれる

An value	1346	832	\$ \$ \$
17.6	5.47	4.84	7. 00. 1.
A7. Ms+1. (X)_	929	12.5	5.7
(\$ 75	7.36	9/.	5.73
Magnething Realing (m)	0		33 5.73
Care to	246	172	203
Elephe Time (min)	300	2/0	247
1/2 (\$\frac{7}{2} \).	0 0 0	0 0 m	3.57

10 ED Air 101 3160

, .,					<u> </u>	••	7.'S
(s)	**************************************	(X) 145W	P+5 (1)	Magnethe (m)	(mm) —	- Ebpt Tine	
SL SI	14.5	· 7/	- "   L-2 - "	44	582	obz	01:9
E P 01	E & S	Lt. 5			607	017	00:11
9711	215	···· 88·3	- که ۱۵  ک8ک	7E 7E	2.20	122	11:81
466	ε .loν	~ D201					

91 tha

filles taber

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ecology and environment

==-3 7-17-87 sit C

-True	Elopse Time	Collection Times	Magnetale Realing (M)	(1) Sty	A·J Ms+J. (X )_	1°9.0	(3)
6:08	292	290	38 30	6.23	586	5.0/	1453
14: 30	210 _		28	5.31	5.40	4.66	474
132	242	2 <11	28	527	5.29	458	.1.1.04
Ü					TOTAL	Air vol.	3531

(1)
$$M_{St} = \int_{\infty}^{\infty} M + Cometon factor$$

$$C_{SS} = \int_{\infty}^{\infty} \sum_{i=1}^{N} \frac{1}{i} \frac{1}{i} \frac{1}{i} \frac{1}{i}$$

	Elophe Time	Corects Times (man)	Magnetale Rosing (M)	(1) S+J		1°J.a_	Aro_ Volume
5:57			47.	6.88			
11:00	303	299	·		649	5.63	1683
· <del>-</del>	210	207	<del>3</del> 7 - · ·		606	5.32	110/
14:30	237	-934	36	6.02	6.00	5.28	1235
18:27		-23 <sup>4</sup> 1	36	5.98	-		
				7	The Air	o/.	4019

110 to to	1442	1067	2911	367/
13.0	4.79	81.5	7.14	)
MJ. (X)	664 985	5.93. 5.18	5.87. 5.14	To land pair vol.
(i) P+S	12.9	700	5.90	•
Magnet L. (1) A.J. M.J. A.J. A. S. A. Volume. Realing (m) S. 4. J. M. + 1. (x)		76	الله الله	
Court (min)	30/	306	22.6	
Time - Elephe Time - (Min) (Min)	307	210	230	
/ne (min)	5:53 8:50 8:50 8:50 8:50 8:50 8:50 8:50 8:50	7:30	( 20	

EE-6 5.t. G 7-17-87

Time (Min)	Elopative (Mio)	Coleta Timi (man)	Magnetali Realing (M)	(1) N <sub>5+J</sub>	ArJ Ms+j_(X)	119.a	Aro_ Valore
6:02			40	6.410			= -
-	298	219	•	602	•		1178
• •	2+0						80/
	248		=	5.85			920
		•		5.64			920
				7	ital Air Vol	<i>!</i> .	2899

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<b>分)ではつ</b>						~!?!	-
4)+32 -			7.79		- An Volume -	~	
			739	-5-5 017		~~~ 1	- 4
40°72 40°51	95.5	69.9	739		1 Lz	~1°	
L.º51				-5-5 0h- 	1		
	95.5	69.9 62.9	-	94		1 4Lz 052	٥
L.051	89.5	b L .9			1 L 4 2	520	٥
L.º51		F1.7	6L.9	94	1		o
L.051	89 5 16.5	6L.9	6-L-9 55-L	94	1 L 4 2	520	o
L.051	89 5 16.5	6L.9	6-L-9 55-L	94 94 95	1 L 4 2	520	o
12071 1158 1128	16.5 16.5	6L.9	6-L-9 55-L	94 94 95	1 L Z L L Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	057 1d8	0
6051 0681 8511	89 5 16.5	F1.7	6-L-9 55-L	94 94 95 (w) Gray Wedsepor	1 L Z L 1-2 961	057 1d8	400

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16-CHR	7-2	1-87				
Elme Time	Contail	Magnetik	(1)	A-7	113.a	An Vot
( Min )	Time (man) -	Rosling (M)	St	Mstd (X)		:
		· · · · · · · · · · · · · · · · · · ·	<u>-</u>	-		
		- 46	-684			
227	168		-	658	5.678	950
		. 40	-6.33			
250	184			6.16	5.367	987
		36	6.01	_ 4		
290	214			5.90	5.17	110
- 1		34	-2-90 ···			
Ť 2 <del>2</del>		-+0	413304.8	co. Li		- 46
			SOT-0	, ~ ~ 17 /		3048
	Correction foctor		1.009	- fary = Lea	2	
	Cometon foctor		1.009	- F - Lea	2	
or fectors	Cometon foctor	Cf2= 6	•	FAUT = LIPE	2	
n feto =	P . Tstd		•	- f <sub>avy</sub> = Leo	2	
on fectors (	P . Tst:1 Pst:1 T		•	- FAUT = LED	2	
or fectors	P . Tst:1 Pst:1 T		•	Aug = Lea	2	
on fectors (	P . Tst:1 Pst:1 T		•	FAY = Lea	2	
= pcto = 1 23	P , Tst:1 13+11 T 0.809		•	Ay = Lea	2	
= pcto = 1 23	P . Tst:1 Pst:1 T		•	PAUT = LIPP	2	
= pcto = 1 23	P , Tst:1 13+11 T 0.809		•	PAUY = Lea	2	
= pcto = 1 23	P , Tst:1 13+11 T 0.809		•	PAY = LOO	2	
= pcto = 1 23	P , Tst:1 13+11 T 0.809		•	- FANY = 1.00	2	
= pcto = 1 23	P , Tst:1 13+11 T 0.809		•	- FAUT = 1.00	2	
= pcto = 1 23	P , Tst:1 13+11 T 0.809		•	FAUT = LIPPO	2	

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8//-		99.S	79-2-		7 4-7	
8998	# 2	92.5	L6-5	- ···98·· ·-	242	742
9171				6 E		-08 445
8//5		98:5	56.5 SL·S	€ E	242	ءِه <u>.</u> ۶کره
9171	- <u>-</u>	1-8.5	L6-5	- ···98·· ·-	842	20 os
9171			56.5 SL·S	€ E		255 05 200 244
9772	- <u>-</u>	1-8.5	56.5 SL·S	€ € <del>9</del> €	842	20 os
9171	- <u>-</u>	178.5 E 2.9	26.5 26.5 66.5		842	25 - 75 05 - 05 08
9772	-5 664 288:5	1-8.5	66.5 56.5 66.5 45.9		5 4 8 	255 05 05 05 05 05 05
9171	- <u>-</u>	178.5 E 2.9	26.5 26.5 66.5		842	25 - 75 05 - 552 05

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- 6-562		in Sate	<u> </u>				
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- 6-56Z		<b>69</b> .5	<b>2</b> 9-5		7 7 7	885	
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· · · · · · · · · · · · · · · · · · ·	ره ک کاری		<b>Z</b> 9.5	78	1 2)2 		<b>0</b> £
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## Data is not accurate

56-5					
7-21-	87				· - · · · · · · · · · · · · · · · · · ·
TimeEloce TimeCONNETS	Magnethe	(1)	A17	119.0	An Idme
TimeElopee TimeCorrection  via) (Mia)(Man)	Rosling (M)	5+1	Mstd (X)		
6:40	46	-			- · ·
220			6.59	5.69	
10:20	40	6.34		5.468	···
14:30	40	6.34			
8-9-1			6.35	5.475	
	- 41	- 6-3-7-			
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1) - Im + Cometo foto					
Gurcha feto = P. Titol					
<u>Q</u> ,					<del></del>
-) Y= 0.689 X + 1.10					
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Als volume = G. # Eligis The					

•	G./R	7-21-8.	7				
	Elephe Time"		Magnethi	(I)	A'J		(3) - An_value
	(Min)	Time (man)	Rosling (M)	Sta	Mstd (X)		
54		•	44	6.69			
: 20	274	264	40	6.34	6.51	5.61	148/
	250	241	34		6.09	5-29	1275
: <b>3</b> 0	281	271		5.89	5.82	5.09	-1379
:			34	5.80.	Total	Ais volum	e 4135
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StJ Const	0.761 X +	0.659					
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eit of	7/22/8	7	plan Buck.	Down	
Site Or/R Time SuperTime	Corrected	Magnetale Rolling (M)	(1) S+J P	A'J	(3) An_/dome
	(min)				
		· · · · · · · · · · · · · · · · · · ·			
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10-20-87

<del>5</del> E-2	7-22-87	~.	
sit O/R		~ -	

Time (Min)	Elapse Time" (Min)	Collected	Magnetaki Rading (M)	N <sub>S+J</sub>	A'J. Mstj (X)	1°J.Q	Are volume
6:08			3 <i>8</i>	6.21			
1200	352	279	35	5.93	6.07	5.31	1481
12.00	180	142	33	2.4.2	5.84	5.13	728
15.00	2 <b>5</b> 4	201	53	5-76		5.15	10 37
19:14	23,	20)	36	5.98	5.87	,,,, 	
					TO [w]	0	3246 cu \$1.

(1)  - 1 - 1 - 1 - Countre forto (Cf)  Countre forto = P. Tstd  Ret T		30.2/ #537	1.00.7.	cf = 1.0.2
Gureton Preto = P. Tetal Both T	Nort	30-/ +537 =	0.977	
(2) Y=0.74X+.809	(34)	<del> 21-92                                   </del>	· · · · · · · · · · · · · · · · · · ·	

3) Air volume = Q + Elipse Time

FE-	3	7-22-87
site	G/R	- -

Time (Min)	Elophe Time' (min)	Corbatel Time (man)	Magnetali Roding (M)	N <sub>S+1</sub>	A*J. Ms+d (X)	(2) 1°J.Q	(3) An volume
6:35			54	7.40			
10	325	325		·	6.94	5.82	1891
1.7.00	180	180	42	6.49	6.94 6.41 6.32	542	97/
15.00 17	10 3		40	6.34	611		1/0
	237	237			6.32	5.35	1268
1. 7			40	6.30		_	
-					TO TOPA	,	4135 G.A.

(1)		
Conclus fector = P. Tital Bita T	- Cf <sub>1</sub> = 1.007	<del></del>
(2) Y= 0.754 X+0.589		

3) Air volume = & # Eliph Time

3) A12 Volume = 0 #	(1)  871 = Im + County futo  Sty = Im + County futo  County futo = In 11/2 + 1.013	6:07 12:00 15:00 15:00 253	F-04 Site 5/R Site 5/R (min) (min)
* Elph Inc		279 142 200	7-22-87
	CB = 0.997	32 5.70 24 4.91 24 4.91 28 5.27	Magnetale: M(1) Rocky (M) Std
	Ching = 1.002	70 5:30 4:78 91 4:91 4:50 17 5:09 4:63 17 7070 Air	(1) AJ. AS.
		1334 639 926 2899 a.#	Are follows

	Are reduce	1913	442	1072	3927
1	136	19.5	5:32	5:28	10 to Oct 0
	A.J. Ms+1 (X)	6.54	£1.9	6.07	
	(5) R (5)	0 0	2 9	0.9	9 0 . 9
	Magnethe Rombing (m)	L ,	o l	27	7.0
7-22-87	Charles (min.)	34/	177	203	
1==05 7 515 0/R	Elepa Tue' (mia)	346	180	206	
かが	. 1	<b>1</b> :9	00:7	°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°°	18:50

Court Peter · · (1)

(2) Y- 0.689 X + 1.10

3) A1-2 volume = 0 = Elper Ta

3898 CA 115:81 1153 613 123 00:51 28.5 081 641 816 15:00 336 88.9 LEE LS81 17:9 8/6 3/5

# Low Volume Sampler Air Volume Calculations and Calibration Data

Correton Factor for Calladoron pa. 8 per 1/2 sulme at standard Temperature.

Gradud (1)	Arg rade	1.006	6001	1.007	100	9001	6001	1.00 )	1.00.1	9001	1.00 9	1.007	1.007	900.1	1.009	1:007	1.007	1.006	6.001	1.00.	1.007	900.1	6000)	7.00%
To Forte for S.	tof the End of that Anguale	126.0	6.0	0.995	7650	1650	0.7	0.995	7660	166.0	0./	0.995	466.0	166.0	6./	56.0	466.0	166.0	0./	764.0	766.0	166.0	_ ;	0.995
Corred	starty tat	102	810.1	1.017	1.02	1.07	1.018	1.015	7.07	1.02	8101	1.015	1.02	1.02	1.015	انهای	1.02	1.02	1.018	1.015	1.02	1.02	1.018	انه اکا
5-50	1819114	7812114	7/21/87	7/22/87	18/91/	1/11/87	7/21/87	7/22/87	1/16/87	1111/87	1/21/87	7/22/87	18/31/1	78/11/2	1/21/87	7122/87	1/16/87	1/11/87	7/21/87	7/22187	18187	18/11/67	7121/87	7122187
SHRE NO	561.	1	*	•	66 2	`	•	•	EF3	•	*	•	E F 4	`			E65	`		•	EE6 .	`		7

squar rost as the cultimb were used in the calculator of our volume by high volume ramples of our fireflicts

Table. Ais volume Colabor of Domples Collected by low volume sample Contd. 2-23-58

ye No.	Date stalte No	Elopae	in.) Average Flo		A.i ToTOA.
DC-(T-15 7	121/87 EE2	506	544.45	0.27	5 0-277
Oc - PT-15	€€2	504	986.4	0.497	,
OC-CT-16	€€ 3	515	5683	0.293	0.296
Dc-PT-16	EE 3	515	377	0.194	0-196
DC-CT-17	EE 4	505	550.5	0.278	0.280
Oc - PT-17	"	505	343.9	0.174	0.176
DC - CT-18	EE 6	505	492.2	0.248	0-250
D-PT-18	<i>e</i> ∈ 6	505	499.9	0.505	0.509
OC- CT-19	EFS	506	502	6.254	0.256
)c - PT- 19	<b>V</b> //	506	9/8.9	0.465	0.469
)C-CT-22 7	1-22-87 EF2	500	535.2	0.268	0-269
DC-PT-22		5∞	972.75	0.486	0.488
Dc- CT-23	E E 3	482	536.5	0.259	0.260
DC - PT - 23	1	482	189.4	-091	-09/
DC-CT-24	FE4	482	489.6	0.236	0.237
OC-PT-24	"	482	180.15	.089	-089
)c-c T- 25	<b>E</b> E 6	484	518	0.251	0.252
OC-PT_ 25	-	•	992.6	048	0482
DC-CT- 26	FFS	483	516.95	_	0.251
	<b>V</b> "	1	903:3	0.436	0.438

Table: Air volume Cal-culations of samples Collected by low volume samples 1/2 pupmed by mC 2-23-88

somple No	shelt no.	Elapse (min	American Plan	vate (me) Total	X DAM
OC - CT- 02 (7/	4871 EE 2	(min) 180	464.9	0.223	c. 225
Dc-Pt-02		480	1059	0508	0.5/20
DC-ct-03	<b>€</b> €3	478	562.85	0.269	0-271
DC-PT-03		778	10 90.65	0.521	0-525
DC-CT-01	ē€1	482	499	0.241	0-243
DC - PT-0,	-	482	789.5	0.38	o.383
DC-CT-06	ee 6	478	352.75	o-169	0.170
)c-P1-06	"	478	1065	0.509	0-513
DC- CT-05	ees	477	468.9	0.224	0.226
x- Pr-cs : V	EES	477	1019.15	0.486	0489
					•
Dc c T- 08 7/17/8	'7	491	5/2./	0.251	0.252
7c-pt-08	"	-191	991.95	0.487	0.490
JC-CT- 09	€€3	486	5595	0.272	0274
c- PT-09	€€3	486	7176	0349	0.35/
11 - CT - 010	E E I	481	500 55	0.241	0.242
)c - PT- 10	e <b>E</b>	481	627.35	0.299	.30/
)c - c T - 11	CE 6	478	393.7	0.188	0-189
)c - PT- i1	ef 6	478	j10 0	0.526	0.529
)c - CT-12	EES	475	S5. 6	0.241	0.242
)c-PT-12	ee5	476	138 85	0.471	0474
(1)					

Std =  $\frac{T_5}{P_5} * \frac{P}{T} * V$ Correction factor for standard Temp & pres. ( See attacked table for The coefficient)

18	-	<u> </u>	-				_					_		<u></u>						-			-							~ *	- 
1460   1975   1675   1760	د مهود مهد ماروج در مهود مهدمه در او ومهدمها مارام درمها			· · · ·			•				OB LOCATION STRAKE AK-CFOI	LO LINDERO DONAS ALATA	ONECEDEURO ESPATES	Arctioned south												Archellenne samth	Attend Sands A	10-34-34 Flymys Bulyser es	Co-technol sampa Ac-N-01		
7/1/87	(4)		**************************************	£6.3-	6.37	EK. 3 C.73	46.8	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			6 ( 6 Am 8	10 m	アンショ	5.33	ı	1	3	7.7.7	74.3			, ,		, ,,		5 4				ı	
73.4 Shirtleft  73.5 Shirtleft  73.6 O 0 975		,	7		10401	100 401									}		42	:	34	:	78	} :	88	;	20	<b>;</b> ;	,	; :	ı	ı	
7/4/ 20		4.0		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	,~ <b>6%</b> ,	519 30	198.301	200		,	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	) Q	10.64	12.700	1	1	6.0	:	**	:	2	· } :	3	·	\$	è :	ì	g :	ı	ı	
7.4/87 (44) (145) 7.4/87 (445) 7.4/87 (445) 7.4/87 (445) 7.4/87 (445) 7.4/87 (445) 7.4/87 (445) 7.4/87 (445) 7.4/87 (445) 7.4/8 (445) 7.4/		10 mg/s	ı _		Ļ	7.0	7.4	C.7	, <u>,</u>	: (	<u> </u>		c,	je ,	5		<b>~</b>	ž	ષ્ટ	<b>\</b>	۲	Ķ	ď	¥	ť	y.			. &		
74/67 CAMPLINE (144 junt)  74/67 CAMPLINE (144 junt)  74/67 CAMPLINE (144 junt)  0251 CAMPLINE (145 junt)  0350 CAMPLINE (145 junt)  0390 CAMPLINE (178 junt)  0300 CAMPLINE (	•	10.700.00 plans	E. of the stante 180 C of Calain		,	(16' x 10 6.487 c4888 x 4xCE			:	Cokula			1009. 99 mar 60 100 m			Y 100 70	nh coench	:	E. of OC FRANCE, 150 'S as queray	:	مد مر دری و ۱ مود دمونوه بوسود	:	NW CORNAR	: :	101 0' 11/16 6 . AST. 10 .544 AST. 10 LI	:	and Co. A and A		AL Sout	ALANK	
	٥٠ سرو.	End Com	/6.45	5491		3	1655	770	011.	3/1/	27.4			757	1	١	,493	2041						13.39					ı	1	<del> </del>
(0/2/)/	N. S. S. W.	VAN 1	SKAO	38.4	. 300	100	0357	2040	2065	0690	0,30	49.35	3	-	000	000,	2010	0702	٠٠.٧	b1/4	07.0	01.0	8120	8/10	2010	25.00	>70.4	2704	ره م	000/	<u>.</u>
28		1	7.4/87	14/1/2)																					,		•				
THE TOTAL PROPERTY OF THE PARTY	i			00 V-C3	\$0.70.70		\$0.77.30	At :: ( - 0)	10.11.30	* 30.75.3	Ac. N. 00 V	\$0.00	10000	40	4C - C/-07	40. A. O.	70·2V-3 <b>0</b>	10-11-01	9c. X .03	#: #. 63	80.26.08	Ac-A-03	4. V. 34	10.14.01	Dc .PC.05	Ac. A. 05	70.2.08	************	Ac-Ac-07"	15 KO-W	

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न्य्	Menten	727	soal load	200 000	Second	Localian	es deuas	Elan START	Crow Can	400.46 000	Charles	i
	\$6-c1-0\$	18/1/2	0830	/63/	Colac times (	that I s at quality by.	5	206.12	518.1ml	June 1345, maric		
	#C - P.F - 08		0110			F	٤	1017.01	1w6 - 946			
	DC: AC:08		070			اخد	ر ک			4.55		<del>-</del>
<b></b> .	4c-1/2-04		0/90		<b>→</b>	<del>र</del> हा	২	**	•	C. 75		<del></del>
	4c.CL-04		of Se	1636	ME OF 5178 8, AAT. CARA	canto Fanca &	, c	£45 &m1	1~6 ELS	2 mar (300) mar 0		
•	Ac-87-09		0430	1636		-	ۇ	/w \$901	367.2ml	;		
	Ac.1. 09		8090	!		400	¥	#		46.3		
~	4c - 166-09		2070		<b>→</b>		į	¥	•	46.3		
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ř. 	40.40.00		0090				2	53		(**)		
2	1c . Fr - 10		0090		<b>→</b>		ž	53		1 66-1		
	* //-JO.30		0847	2491	3176 6 . mt c	Cooned	0.7	12.84	305.4~1	A.V. 1348. max.0	CD-600 (140-1)	
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ek (c			C03.			ļ	Ę	\$		7- 77		
-	Ac- 16-11		6090		<b>→</b>	-1	**	Ŷ		9.22	<b>-</b>	_ <del></del> -
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**	BC-14-19		0060	1656		-	٤	/w/ho/	136.7	:		
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	<b>←</b>						_																			7/4/87	AGO	
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· · · · · · · · · · · · · · · · · · ·	1	1	1	ı	<b>44</b>	44	*	٧,	863.92	+ 50000	34	45	# 1007m)	1007 104	32	3/	185.4~1	615.541	36	36	והסינב	W6.6m/	34	34	918.6~1	100455	Cran Card	
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	1	1	,	1	1	¥	37	37	840./21	516.9~1	35	35	984.2~1	531.001.	2	2	40.3ml	523 ~/	40	40	18.8 ml	611.9~1	. 36	36	975.3~1	529.6~1	Can Cod	
:	,	1	1	1	1.33	64-1	66.5	82.5		bread 2016 comb	62.6	7.87	:	المعمر الانه والمسا	4.30	24.4	:	يسعمر يحدد وحدرا	86.9	N . N	:	Amo, 3656, Am. A	7. Y	( · )	:	SOR GALL PURPLES	mad cat	
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## APPENDIX D

### ANALYTICAL RESULTS

#### Explanation For Analytical Data Summary Tables

All ground water results in ug/l.

All soil/sediment organic results in ug/kg

All soil/ sediment inorganic results in mg/kg

For sample location headings, the following qualifiers are used :

+ Denotes blank samples.

\* Denotes duplicate samples.

Denotes that sample was not analyzed for the compounds listed.

For chemical results, the folling qualifiers are used :

B Compound detected in blank samples.

J Estimated value. Result is less than the specified detection limit, but greater than zero.

E Estimated value. Concentration detected exceeds the calibrated range.

C Result confirmed by GC/MS.

\* Duplicate analysis not with in control limits.

R Spike sample recovery not with in control limits.

				130 1	C 97		091	180					320	ζ	Styrene Styrene Sotal Iylenes	
			1 1		310		r 82	22 1					t I		Starene Character	
s			11	00011	0071	£ 0049	1400	0051	ı	62	200 €	22	ti	<b>)</b> 1	Chlorobenzene	
	5.1			1200	f Be	F 0071	019	420		•			f b		Toluene	21
															1,1,2,2-Tetrachloroethane	20
															Tetrachloroethene	
•		•				2290 1							rs		2-Hexanone	58
				2900	140 1	2 0012	240	OSZ							4-Hethyl-2-pentanone	
															Brosstore	
															2-Chloroethyl Vinyl Ether	
										•				*	cis-1,3-Dichloropropene	
	t 1		5 1	4200	1400	2000	5000	2000	L 1	t I	<b>♦</b> I	1 1	٥Z	6	Pentene	
															anadisavoldatai-5,i,i	
															Dibrosechlorosethane	
•										7.7					Trichlaracthers	
															1,2-Bichloropropene 1,2-Bichloropropene 1,3-Bichloropropene	
( 1																
															Proceduchleresethane	
															Carbon Telrachlaride	
															Sasdisoveldativi-i,i,i factor foleschloride	
															2-butanene (MEK)	• -
						2000									1-2-Bichloroethane	
4	f Z			2000		0001				r i					Chlorotora	
•										11			r 1		trans-1.2-Bichloroethene	
										• •			• •		1,1-Dichloroethane	
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															Carbon Disulfide	-
		4 83	L B	A10 B1	110 011	■ 001/	210 B	400 B	12 3	8 ZI	4 11	10 0	ff 4	<b>\$1</b>	Acetone	
ra i	. 9	87	r e1	140 7		5500 03	£ 19	32 1							Hethylene Chloride	
															Chloroethane	•
															Vinyl Chloride	
															mand frames vil	
												_			Chloresthase	1
	.0.11.5		10 17 5	48.41.0	(4 (1 )	2-19-0)	2-19-83	48.01.5	40.01.5	/A 81 C	40.07.5	<b>40.0</b> 2.0			433 4444 31444	
2012-03 2019:33	1019-33	20-21-9 20-33	2-11-01 EE-02	20-33 20-33	18-11-2 10-33	81-33		2-19-83 EE-18	20-91-S 80-33	71-33 7-11-6	2-19-91 01-33	2-19-8) EE-08		2-19-13 10-33		
1019-33 \$!-#9-36	\$1-89-36	9C-99-12	0C-99-13	DC-68-11	DC-64-10	PC-64-09	1 00-89-30	10- <b>19-3</b> 3	96-93 DC-68-09	SC-68-05	10-89-36	DC-08-02		10-19-33		
9 3115	9 31 IS	N 3115	M 3T12	N 3115	N 3118	0 3115	0 3115	0 3115	8 3118	0 JUS	0 3115	8 JUS	. 0 3114	0 3115	3115	•

Estificial valek beward

		SITE	SITE 8	BLANK	SITE L	SITE 6	SITE &	SITE 6	TLMK	SITE I	SITE I	SITE 1	SITE 1	SITE I	SITE I	SITE I	DE 414.
		SAMPLE MUMBER MELL MUMBER BATE SAMPLED	9C-60-16 EE-6104 3-17-07	BC-6N-17 +	9C-GN-18 EE-G108 3-18-87	BC-GN-19 EE-G107 3-18-07	9C-6H-20 8 EE-GI07 3-10-07	DC-GM-21 EE-05 3-10-07	DC-60-22 + 3-10-07	BC-60-23 EE-13 3-23-87	BC-GN-24 EE-12 3-23-87	BC-6H-25 EE-6112 3-23-87	DC-GN-26 EE-14 3-23-07	DC-64-27 EE-15 3-23-87	BC-6N-28 EE-14 3-23-87	BC-60-29 1 EE-12 3-23-67	DC-64-30 + 3-23-67
	٠,	Chiorogethane		• •				-	•								
	2	<b>Bronocethane</b>															
		Vinyl Chloride										5.1		76	790	4 J	
		Chioroethane Methylene Chioride	5 D			110 H	250 B		2 93	,			Sá J	2 J			2 ;
		Acetone Culturate	3 P			420 B	230 B		4 BA		40 8	17 8		10 8	190 B	16 D	23 P
		Carbon Disulfide				<b>317 3</b>	<b></b>				***	•		10 0	1.0 5		20 .
		1,1-Backloreethene												10			
		1.1-Bichloroethane												170			
	10	trans-1.2-Dichloroethene				186 J	200 J						150	310	640		
	11	Chierofore	3.1	1.1					1.1				110 J				
		1-2-Bichloroethane	i			480	430										I
		2-Butanone (MEK)															
		1,1,1-Trichloroethane	i			1					1			I	1		1
		Carbon Tetrachloride															
		Vinyl Acetale							'			,					
		Broadichlorosethane															
		1,2-Dichloropropane						•									
		trans±1,3-Bichloropropone Trichloroethene	•			124	744						270				
		Dibroschlorosethane				320	300						270	4 J			-
		1.1.2-Trichloroethane															
		Denzene	1.3		1.	J 4100	3700	2 J	2.1		Su	29	1406	5	550	75	
		cis-1,3-Bichleropropene			• •	* ****	3.00							•	2.00	,,	1
		2-Chiproethyl Vinyl Ether															
		Brosofora .												1			
		4-Hethyl-2-pentanone				1900	7700						230 J	·			
		2-Hexanone							4 J								
	29	Tetrachloroethene				420	350	14					47ú				
-	30	1,1,2.2-Tetrachloroethans	•			'											
		Toluene	2.1			7300	<b>†200</b>	2 J					240		740	1 J	
		Chlorobenzene	5	1 J	1.		3100	1 3	2 J		270	33	3100	120	550	390	
		Ethylbenzene				63 J						1.1	170		5 <b>3</b>	2 J	
		Styrene				59 J											
	35	Intal Ivienes				290	240 J						61 J		58		

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		_	2335555	55=5 <b></b> .			
# 60 A	Tetrachlorethene L,1,2-Tetrachloreethene Telumne Chigrobenzene Ethylbenzene Styrene Tetal Tylenes	Li,2-Frichlerethane Enzene Cin-1,3-Bichlerepropene 2-Chlorethy! Viny! Ether Presefore 4-Helby!-2-pentancie	i,1,1-frichlerethame Carban Tetrachleride Vinyl Acetate Broandichlerenthame 1,2-bichlereprepame tran-1,3-bichlereprepame	Larem systine Li-Bitchlorothene Li-Bitchlorothene trans-Li-Bitchlorothene Chlorofore L-Ditchlorothene L-Ditchlorothene	Chlorosthane Dynamethane Vinyl Chloride Chlorosthane Hethylese Chloride Acotane	SAMPLE MUMBER MELL MUMBER	31.5
					3	BC-6W-31 EE - 20 3-23-07	1 3115
: <b>1</b>	400 E	•				JC-6#-32 EE-11 3-24-87	9 3115
	1290	150	\$ <u>.</u>	<b>£</b> =	2140	DC-64-33 EE-6106 3-24-87	9 3118
	20				7 8	DC-68-34 EE-6102 3-24-07	9 3115
<del></del> .	¥			- E	-	DC-6H-34A EE:6102 7-14-87	9 3118
				-		DC-6H-35 + 3-24-87	7
	•	ī.				9C-6H-36 EE-6110 3-24-97	3118
	<b>970 0</b>	5 <b>50</b>		730	5 ±	DC-GH-37 EE-G109 3-24-07	211E L
					2	DC-681-38 EE-21 3-24-87	9118
			;	<u>.</u>		DC-640-38A EE-21 7-14-97	9115
•	15000	190000 190000	7808	5000 J	52000 38000 B	9C-6H-39 EE-22 3-24-87	0 3115
200	1300 1300 1300 1500	150000 E	\$600 E	1700 14000 1800 2400	31000 34000	8C-68-39A EE-22 7-14-87	0 3115
					• •	DC-6H-40 EE-23 3-24-87	9 3118
	ξ		:	=		DC-6W-40A EE-23 7-14-07	9 3118
2		Į o			<b>:</b>	DC-60-41 EE-24 3-24-87	S11E 0
	•	20	1			DC-641-41A EE-24 7-14-87	3118

				# 311e	H 2110	H 3700 H 3100		# 21.E	2116		į			THE VALLE		TR' VAIL
SANTE NUMBER NELL MUNDER PATE SANTED	EC-48-42 1 EE-24 3-24-07	EC-68-45 EE-75 3-24-87	EC-58-43A EE-25 7-14-87	DC-58-44 P-1 3-25-97	008-45 0-284 3-25-67	IC-68-44 P-7 3-25-07	BC-68-47 B-26A 3-25-87	DC-GH-401 D-264 3-25-07	DC-64-49 9-25A 3-25-97	P-11 3-25-87	BC-68-51+ 3-25-87	NC-68-52 WRIGHT 3-26-87	9C-68-53 SETILES 3-26-87	BC-64-54 SCHILDT 3-24-87	BC-68-55 Rc DORAL 9 3-26-67	0C-64-54 CLAYTOR 3-24-67
i Chierasethane	:		:		<b>i</b>		: : :								,	
2 Drassethine 3 Vinyl Chleride																
4 Chloroethane																
5 Methylene Chloride	210	i										2	13 6		37	
6 Acres	3	Z			- I		2	2 %	0091	3¢ BJ	2 .	=	9	2	2	_
7 Carbon Disulfide																
1,1-Dichlereethene							^									
9 1.1-Bichloreethene							3.3									
10 trans-1,2-Bichloroethene	7 %															
11 Chloroform											7		7 7			
12 1-2-Dichioroethane									16000		•		•			
13 2-Butanene (MEK)	570		2													
14 1,1,1-Trichloroethane	7 27															
15 Carbon Tetrachloride																
16 Vinyl Acetate																
17 brosodichlorasethane																
18 1,7-Bichloraprapare	ŧ					•									ŀ	
19 trans-1,3-Dichlerepropens	ī															
20 Trichloroethene	86															
_																
- '																
Z3 Benzene	3			7 7		1500	7	7		<u>%</u>						
_	•															
25 2-Chloroethyl Vinyl Ether	Ē															
26 breesfers																
27 4-Hethyl-2-pentanone																
28 2-Henanone																
24 letrachiacaethene																
_	š															
31 Teluene	2					3	1.	3		•		-	-		-	
32 Chlerebenzene	100			350 6	940	905		: : <u>:</u>	9	539	-	2	2		-	` :
_				1		•	2.3	:		÷	•	7				
							,					•	1.6		1 (	
W. John Puleses							1						•		•	

25 - Chieros 25 - Chieros 26 Brussfort 27 - (McKhyl- 27 - (McKhyl- 28 - Jerzachi 29 Tetrachi 30 1,1,2,2-1 31 Tolumne 32 Chlarober 33 Ethylben;	Vinyl Chi 4 Chlorott 5 Methyless 6 Metone 6 Metone 7 Carbon 31 8 Li-Bichi 10 trans-1; 11 Chlorott 11 1-2-Bichi 12 1-2-Bichi 13 2-Bichon 14 13 1-3-Bichi 13 2-Bichon 14 14-7-Bichi 15 Trans-1; 16 Trans-1; 17 Brans-1; 18 trans-1; 19 trans-1; 19 trans-1; 10 trans-1; 10 trans-1; 11 trans-1; 12 trans-1; 13 trans-1; 14 trans-1; 15 trans-1; 16 trans-1; 17 Brans-1; 18 trans-1; 19 trans-1; 10 trans-1; 11 trans-1; 12 trans-1; 13 trans-1; 14 trans-1; 15 trans-1; 16 trans-1; 17 trans-1; 18 trans-1; 19 trans-1; 10 trans-1; 11 trans-1; 12 trans-1; 13 trans-1; 14 trans-1; 15 trans-1; 16 trans-1; 17 trans-1; 18 trans-1; 18 trans-1; 19 trans-1; 10 trans-1; 10 trans-1; 11 trans-1; 12 trans-1; 13 trans-1; 14 trans-1; 15 trans-1; 16 trans-1; 17 trans-1; 18 trans-1; 19 trans-1; 19 trans-1; 10 trans-1; 10 trans-1; 10 trans-1; 11 trans-1; 12 trans-1; 13 trans-1; 14 trans-1; 15 trans-1; 16 trans-1; 17 trans-1; 18 trans	SITE SAMPLE MAN MELL MANNE MATE SAMPL I Chlorosel
recthyl Vinyl Ether bra yl-2-pentanone none 2-Tetrachloraethane benzene mizene	,	RLANK MECR 0C-94-57 ER FL 7-14-87

34 Styrene 35 fotal Tylenes

#### Ground Nater Senivolatiles

_(1'	SITE	SITE 0	SITE	SITE 0	SITE 0	SITE 0	SITE 0	SITE B	SITE 8	SITE O	SITE M	SITE N	SITE N	SITE H	SITE 6
• ;	SAMPLE MUMBER MELL MUMBER	DC-GH-01 EE-04	BC-6H-02 EE-07	DC - GM - 03 EE -09	DC-5M-04 EE-10	DC-64-05 EE-17	DC-60-06 EE-00	DC-6W-07 EE-19	OC-6H-00 I EE-19	DC- <b>GU</b> -09 EE-18	BC-60-10 EE-01	DC-GN-11 EE-02	BC-60-12 EE-03	DC-GW-13 EE-04	BC-60-14 EE-8151
<b>●</b>  •	BATE SAMPLED	3-16-07	3-14-67	3-16-87	3-14-07	3-14-87	3-16-87	3-14-87	3-16-87	3-16-87	3-17-87	3-17-07	3-17-97	3-17-67	3-17-97
;	1 Phone 1	-						110000 E	190000 E	4100 €	44	950			
	2 bis(2-Chloroethyl)ether														
	3 2-Chlorophonol				4 3			20000 E	33000 E	2400	31 J	47 J			
10	4 1,3-Bichlorobenzene										120				
• ••	5 1,4-Dichlorobenzene				4			220 J	250	70 J	2600	530	11		
i'ri	6 Benzyi Alcohol							460	490	190	*	740	_		
	7 1,2-Bichlorobenzene							260	300	2000	560	430	3		
•'**	8 2-Hethylphenel							199 3	350	10 3	26 J	70 J			
1.	9 bis(2-Chlorossopropyl) o	ther	2.1												
14.	10 4-Hethylphenol							14000 E	23000 E	850	65	620			
•	II M-Mitroso-n-Dipropylanin	•													
14.5	12 Hexachloroethane														
1	13 Mitrobenzene								100 J	820		97 J			
	14 Isopherene											110 J			
	15 2-Witrophenel														
	16 2,4-Biaethylphenol		5 3						2900	62		330			
●	17 Denzoic Acid		10 J							600	140 J	\$ <b>9</b> 00 E			
~ · ·	18 bis-(2-Chiereethexy)meth	796													
	19 2,4-Dichlorophenol							1900 E	14000 E	7600 E		1700			
	20 1,2,4-Trichlorobenzene									390	580	720			
	Zi Haphthalene							41 J	42 J	70	250	240			1 J
7.0	ZZ 4-Chloroamiline	120						14000 E	15000 E	4400	6490 E	810	200		
●'	23 Hexachlorobutadione														
~ -·	24 4-Chioro-3-sethylphenal														
,,	25 7-Methylnaphthalene										21 J	47 3			
	26 Hexachlorocyclopentadien	•													
	27 2,4,6-Trichlorophenol							4100	1000	1800	140	1200			
pal .	28 2,4,5-Trichlorophenol										27 1	590 J			
	29 2-Chloronaphthalene														
•	30 2-Mitroaniline							1700	1860	2000					

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#### Ground Mater Sensyplatiles

SITE	SITE 6	SITE 6	PLANK	SITE L	SITE 6	- SITE 6	SITE 6	BLANK	SITE	SITE I	SITE I	SITE I	SITE 1	SITE I
SAMPLE NUMBER	DC-6H-15	SC-GN-16	DC-60-17 +	DC-60-18	BC-SW-19	DC-6H-20 1	DC-98-21	BC-GH-22 +	DC-GH-23	BC-GW-24	DC-60-25	DC-6H-26	BC-GN-27	DC-60-20 EE-16
BATE SAMPLEB	3-17-87	3-17-87	3-17-07	3-10-07	3-10-07	3-10-07	3-10-07	3-10-07	3-23-07	3-23-07	3-23-07	3-23-67	3-23-07	3-23-87
						- Tobbe						1800		90
					2004	20000						1900		•
												776		
					470	1700						379		
,														
										640			10	119
														359
-,										110			. 43	
• •					290 J	<b>810</b>						89 J		76
• •					2200	7000						330		
12 Hexachloroethame														
13 Mitrobenzene														
14 Isaphorane														
15 2-Nitrophenol														
					1400	4300								
						****				2.1		2900		
										••				
		4.1												230
		• •			21000 €	10000				140	14		10	750 E
										140	14	8300	10	<b>*B</b> ((() <b>£</b>
	_											140 J		
• •										1.3				1 1
						350						290		
29 2-Chlorenaphthalene														
_	SAMPLE MUMBER MELL MUMBER DATE SAMPLEB  1 Phenol 2 bis(2-Chloroethyllether 3 2-Chlorophonol 4 1,3-Bichlorobenzene 5 1,4-Bichlorobenzene 6 Benzyl Alcohol 7 1,2-Bichlorobenzene 8 2-Methylphenol 9 bis(2-Chloroisopropyl) ether 10 4-Methylphenol 11 N-Mitroso-n-Bipropylanine 12 Metachloroethane 13 Mitrobenzene	SAMPLE MUMBER  WELL MUMBER  SET SAMPLEB  1 Phenol 2 bis(2-Chloroethyllother 3 2-Chloroethyllother 3 2-Chloroethyllother 4 1,3-Bichlorobenzene 5 1,4-Dichlorobenzene 6 Benzyl Alcohol 7 1,2-Bichlorobenzene 8 2-Methylphenol 9 bis(2-Chloroisopropyl) ether 10 4-Methylphenol 11 N-Nitroso-n-Bipropylanine 12 Mexachloroethone 13 Mitrobenzene 14 Isophorome 15 2-Mitrophenol 16 7,4-Bisethylphenol 17 Benzoi Acid 18 bis-(2-Chloroisopropyl) ether 19 2,4-Bisethylphenol 20 1,2,4-Trichloroethozy)nathane 21 Maphtholene 22 4-Chloro-3-methylphenol 23 Mexachlorobutadiene 24 4-Chloro-3-methylphenol 25 2-Methylnaphtholone 26 Mexachlorocyclopentadiene 27 2,4,5-Trichlorophenol 28 2,4,5-Trichlorophenol	SAMPLE NUMBER NELL NUMBER SET-6103 EE-6104 BATE SAMPLEB 3-17-87 3-17-87  I Phenol bis(2-Chloroethyllother 2 2-Chlorophenol 4 1,3-Bichlorobenzene 5 1,4-Bichlorobenzene 6 Benzyl Alcohol 7 1,2-Bichlorobenzene 8 2-Nethylphenol 9 bis(2-Chloroisopropyl) ether 10 4-Rethylphenol 11 N-Nitroso-n-Bipropylanine 12 Hexachloroethane 13 Nitrobenzene 14 Isaphorone 15 2-Nitrophenol 16 7,4-Biaethylphenol 17 Benzoic Acid 18 bis-(2-Chlorosthozy)nathane 19 2,4-Bichlorophenol 20 1,2,4-Trichlorophenol 21 Haphthalene 22 4-Chloro-3-nethylphenol 23 Hexachlorobutadiene 24 4-Chloro-3-nethylphenol 25 2-Nethylnaphthalene 26 Hexachlorocyclopentadiene 27 2,4,5-Trichlorophenol 28 2,4,5-Trichlorophenol	SAMPLE NUMBER NELL NUMBER SET-6103 EE-6104  BATE SAMPLEB 3-17-87 3-17-87 3-17-87  I Phenol bis(2-Chloroethyllether 2-Chlorophenol 4 1,3-Bichlorobenzene 5 1,4-Bichlorobenzene 6 Benzyl Alcohol 7 1,2-Bichlorobenzene 8 2-Nethylphenol 9 bis(2-Chloroisopropyl) ether 10 4-Rethylphenol 11 N-Nitroso-n-Bipropylanine 12 Hexachloroethane 13 Nitrobenzene 14 Isaphorane 15 2-Nitrophenol 16 7,4-Bisethylphenol 17 Benzoic Acid 18 bis-(2-Chlorostopyl)azthane 19 2,4-Bichlorophenol 20 1,2,4-Trichlorophenol 21 1,2,4-Trichlorophenol 22 4-Chloro-3-sethylphenol 23 Hexachlorobutadiene 24 4-Chloro-3-sethylphenol 25 2-Nethylnaphthalene 26 Hexachlorocyclopentadiene 27 2,4,5-Trichlorophenol 28 2,4,5-Trichlorophenol	SAMPLE NUMBER   BC-GM-15   BC-GM-16   BC-GM-17 + BC-GM-18     MELL NUMBER   EE-GLO3   EE-GLO4   EE-GLO8     BATE SAMPLEB   3-17-87   3-17-87   3-18-87     Phenel   2 bis(2-Chloroethyl)ether   3 2-Chloroethyl)ether   3 2-Chloroethyl)ether   3 2-Chloroethyl)ether   4 -Bichlorobenzene   4 i.3-Bichlorobenzene   4 denzyl Alcohol   7 1,2-Bichlorobenzene   6 2-Methylphenol   7 bis(2-Chloroisopropyl) ether   10 4-Methylphenol   1	SAMPLE NUMBER   BC-6N-15   BC-6N-16   BC-6N-17   BC-6N-18   BC-6N-19     MELL MUMBER   EE-6103   EE-6104   EE-6108   EE-6107     BATE SAMPLEB   3-17-87   3-17-87   3-17-87   3-18-87   3-18-87     1	SAMPLE NUMBER   BC-GH-15   BC-GH-16   BC-GH-17   BC-GH-18   BC-GH-19   BC-GH-20   BC-G	SAMPLE NUMBER   BC-Gu-15   BC-Gu-16   BC-Gu-17   BC-Gu-19   BC-Gu-20   BC-G	SAMPLE MUMBER   BC-GM-15   BC-GM-16   BC-GM-17   BC-GM-18   BC-GM-20   BC-GM-21   BC-GM-22   BC-G	SAMPLE NUMBER   BC-68-15   BC-68-16   BC-68-17   BC-68-18   BC-68-21   BC-68-22   BC-68-22   BC-68-22   BC-68-23   BC-68-23   BC-68-24   BC-68-24   BC-68-25   BC-6	SAMPLE MANNER   DC-68-15   DC-68-16   DC-68-17   DC-68-18   DC-68-19   DC-68-21   DC-68-22   DC-68-22   DC-68-22   DC-68-23   DC-68-24   DC-68-25   DC-68-26   DC-68-26   DC-68-26   DC-68-26   DC-68-27   DC-68-26   DC-68-27   DC-68-28   DC-6	SAMPLE MANNER   BC-68-15   BC-68-16   BC-68-17   BC-68-18   BC-68-29   BC-68-21   BC-68-21   BC-68-22   BC-68-23   BC-68-24   BC-68-25   BC 68-25   BC 6	SAMPLE NUMBER   SC-001-15   SC-001-16   SC-001-17   SAMPLE NUMBER   NC-60-15   NC-60-16   NC-60-10   NC-60-10   NC-60-10   NC-60-20   NC-60-20   NC-60-22   NC-60-23   NC-60-23   NC-60-23   NC-60-25   NC-6	

30 2-Mitroaniline

	_														
19	l Phenol	EC-68-29 1 EE-12 3-23-07	DC-68-30 + 3-23-07	DC-59-12 EE-11 3-24-07	Í	EC-68-54 EE-6102 5-24-07	EE-6102 7-14-87	8C-88-35 + 3-24-07	BC-68-34 EE-6110 3-24-07	EC-64-37 EE-6109 3-24-87	EC-68-38 EE-21 3-24-87	EC-52-36A EE-21 7-14-87	EC-68-39 EE-22 3-24-07	EC-08-3% EE-22 7-14-07	EC-68-49 EE-23 3-24-07
1.00					2.5					2			*	=	
1,2-th follow decrease   110   110   120	2 Dis(Z-Ehlersethyl)ether 3 2-Chierantenei			5	•								•		<b>-</b>
1, -   -   -   -   -   -   -   -   -   -	4 1,3-Bichlarabanzane	=		<u> </u>						Ŗ			<b>R</b> 5		_
Head of the company	5 1,4-Dichlerebenzene	3		36 5	×								9999		
1,2***   1,2***   1,2***   1,2***   1,2***   1,2****   1,2*****   1,2************************************	6 Benzyl Alcebel														
1.24   1.24	7 1,2-Bichleraberzene	=			;								*	008	
Color   Colo	9 bis(2-Chlereiserpay) ether									-			=	2	
Helitron-Hipropylanie     Helitron-Hipropylanie     Hearthinesthere     Hearthinesth				37 4						2			92	8	
Marie blor out base   Marie blor out base   Marie blor out base   Marie blor out base   Marie blor out base   Marie blor out base   Marie blor base   Mari	11 W-Mitroso-n-Dipropylanne									•			•	:	
Histophenee	-														
Inspirement   Inspirement	-														
2-Hitropheni 3,4-Incethylpheni berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al berrare for et al commended for et															
2,4-theethylphenel     240       Benanc & Left     240       Benanc & Left     220       1,2,4-Trichlerobezone     34 July       Righthalene     34 July       4-bistonerophenel     34 July       Righthalene     34 July       4-bistonerophenel     34 July       4-bistonelise     110       4-bistonelise     30 60       4-bistonelise     30 60       4-bistonelise     30 60       4-bistonelise     30 50       4-bistonelise     30 50       5-bistonelise     30 50       <	-									7					
Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design   Act   Act     Design     Design   Act     Design     Desi	-			240						•			(F)	\$	
11   26   276	_												3	•	
2,4-bicklorophend	_														
1,2,4-frichlerebenzene 34 J 280 110 110 110 110 110 110 110 110 110 1	-				=								3		:
Highthalene					*										
4-Chlereamiline 78 1500 € 110 30 60 70 70 70 70 70 70 70 70 70 70 70 70 70	=			3									3		
Menachlor obutadisme 4-Chlor o-3-methylphani 2-Methylphani Menachlor oxyclopentation 2-4,5-Trichlor ophani 3-1,5-Trichlor ophani 3-Chlor oxphani 2-Chlor oxphani 2-Chlor oxphani 2-Chlor oxphani 2-Chlor oxphani 2-Chlor oxphani		2		2000	911				5	3			<b>.</b>		
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Ground Water Semi-olatiles

_(1)	SITE	SITE 0	SITE O	SITE 0	SITE 0	SITE B	SITE B	SITE R	SITE A	SITE R	SITE R	SITE R	SITE R	SITE R	<b>BLANK</b>	PRIVATE	PRIVATE
	SAMPLE NUMBER MELL NUMBER	9C-GH-46A EE-23	DC-GN-41 EE-24	OC-6H-41A EE-24	BC-GH-42 8 EE-24	DC-GH-43 EE-25	DC-GN-43A EE-25	DC-68-44 P-1	BC-GN-45 D-28A	BC-6H-46 P-7	DC-50-47 D-26A	9C-6U-481 9-76A	BC-GN-49 B-25A	BC-6H-50 P-11	BC-6W-51 +	BC+6N-52 Wright	DC-EW-53 SETTLES
	DATE SAMPLED	7-14-07	3-24-87	7-14-87	3-24-87	3-24-87	7-14-07	3-25-07	3-25-07	3-25-87	3-25-87	3-25-87	3-25-07	3-25-87	3-25-07	3-26-87	3-26-87
7	[ Phenol									75000 E			60000 E				
	2 basi2-Chieroethyl)ether																
.[*]	3 2-Ehlerephonel							4.3	9.7	2100	9 3	4.7	14000 E				
1161	4 1,3-Bichlerebenzene 5 1,4-Bichlerebenzene							8.1		55ú	4.1	3 1		54 .			
	6 Denzyl Alcohol							• •		750	• •	2.4		34 .			
;'1	7 1,2-Dichlorobenzene		_							340	1 1	1 J	91 J				
	8 2-Hethylphonyl				_					340	, .		71 3				
	9 bis(2-Chloroisopropyl) ethe	••															
lis	10 4-Hethylphenol									120 J			4100				
	11 N-Nitroso-n-Oipropylagine																
•	12 Hexachleroethane									850							
	13 Nitrobenzene										35	29	420				
•1.	14 Isophorone																
	15 2-Mitrophenol																
14.1	16 7,4-Bisethvlphenol												140				
<b>A</b>	17 Benzoic Acad									270 J			4800				
	18 bis-(2-Chloreethoxy)aethan	•															
[]	17 2,4-Bichlorophenol									3500			14000 E				
	20 1,2.4-Trichlorobenzene																
<b>-</b>	21 Naphthalone									82 J							
	22 4-Chloroamiline						-			25000 E	680	540		4100			
	23 Hexachlorobutadiene																
- 10	24 4-Chioro-3-methylahemol																
1,1	25 2-Methylnaphthalene	-								200							
	26 Hexachiorocyclopentadiene																
-1,,,	27 2,4,6-Trichlorophenol									2100			1500				
144	28 2,4,5-Trichloroehenol																
	29 2-Chloronaphthalene																
_ ,	30 2-Nitroaniling																

EMMTE NUMBER   EC-84-55   C-84-55		SITE	PRIVATE	PATVATE	PRIMIE	N. Asig	
Mit SAMPLE  bis (2-Chievestee)  2-Chievestee  2-Chievestee  1,2-Bitchievestee  1,2-Bitchievestee  2-Bitchievestee  1,2-Bitchievestee  1,2-Fitchievestee  1,2-Fitchievestee  1,2-Fitchievestee  1,2-Fitchievestee  1,3-Fitchievestee  1,3-Fitchievestee  1,3-Fitchievestee  1,3-Fitchievestee  1,3-Fitchievestee  1,3-Fitchievestee  1,3-Fitchievestee  1,4-Fitchievestee  2-Bitchievestee  1,4-Fitchievestee  2-Bitchievestee  1,4-Fitchievestee  į	SAMPLE MUNDER	X-86-32	EC-68-55	7-35-32 20-35-32	BC-68-57 +		
Phone I  bis 2-Chleroethyllether 2-Chleroethyllether 3-Chlerobease 1,3-Bichlerobease 1,4-Bichlerobease 1,4-Bichlerobease 1,2-Bichlerobease 2-Hethylphenel bis (2-Chlerosampropyl) ether 4-Rethylphenel Bis (2-Chlerosampropyl) ether Hitrosa-a-Byropylasine Bis (2-Chlerosampropyl) 2,4-Bisethylphanel Benzeic Acid bis - (2-Chlerophanel 1,2,4-Firchlerobease 1,2,4-Firchlerobease 1,2,4-Firchlerobease 1,2,4-Firchlerobease 1,2,4-Firchlerobease 1,3,4-Firchlerobease 2,4,4-Firchlerophanel 2,4,4-Firchlerophanel 2,4,5-Firchlerophanel 2,4,5-Firchlerophanel 2,4,5-Firchlerophanel 2,4,5-Firchlerophanel 2,4,5-Firchlerophanel		DATE SAPLED	3-26-07	3-26-07	3-26-07	7-14-07	
bis(2-thloroethyl)ether  2-thloroethyl)ether  1,3-Bithlorobeazone  1,4-Bithlorobeazone  2-thiplohenel  bis(2-thlorobeazone  2-thiplohenel  bis(2-thloroethane  B-thitogeanel  B-tittogeanel  2,4-Bichloroethane  1,2-Bichloroethane  1,2-Bichloroethane  2,4-Bichloroethane  1,2,4-Bichloroethane  2,4-Bichloroethane  2,4-Bichloroethane  1,2,4-Bichloroethane  2,4-Bichloroethane  2,4-Bichloroethane  2,4-Bichloroethane  2,4-Fittohoroethane  2,4-Fittohoroethane  2,4-Fittohoroethane  2,4-Fittohoroethane  2,4-Fittohoroethane  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel  2,4-Fittohoroethanel	1	Thens!		1	:		
2-Chlorophonol 1,3-Bibliorobanzone 1,4-Bibliorobanzone Berzyl Alcohol 1,7-Bibliorobanzone 2-Rethylphonol 1,2-Bibliorophonol B-Hitronon-Byropylanne Helbylphonol H-Hitronon-Byropylanne Herbylphonol H-Hitronon-Byropylanne Herbylphonol 2,4-Bioethylphonol 2,4-Bioethylphonol 1,2,4-Tichlorobanzon Haydy-Tichlorobanzon Haydy-Tichlorobanzon Haydy-Tichlorobanzon Chloroniline Henachlorocyclopentadion 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol 2,4,6-Tichlorophonol	~	bis(2-Chloraethyl)ether					
1,3-9ichlerebenzene 1,4-9ichlerebenzene 1,4-9ichlerebenzene 1,2-9ichlerebenal 1,2-9ichlerebenal 1,2-6ichlerebenal 1,2-6ichlerenapropyl) ether 4-flethylphenel 1,4-6ichlerenapropyl) ether 4-flethylphenel 1,4-6ichlerephenel 2,4-8ichlerephenel 1,2,4-flethylphenel 1,2,4-flethylphenel 2,4-flethylphenel	•	2-Chierophonei					
1,4-Dichlorobenzene Benzyl Alceni  1,7-Dichlorobenzene 2-Rethipsbenel  1,2-Dichloropenel  1,2-Dichloropenel  1,2-Dichloropenel  2,4-Dichloropenel  2,4-Fichloropenel  2,4-Fichloropenel  2,4-Fichloropenel  2,4-Fichloropenel  3,4-Fichloropenel  4,4-Fichloropenel	•	1,3-Dichlerobenzene					
	•	1,4-Dichlorobenzene			S		
	•	Denzyl Alcohol					
N44558-N009N-5656WENNUV	1	1,7-Bichlerabenzene			C N		
	-	2-Hethylphenel					
4 = 2 = - N O 2 N - 2 O 2 O N O N O N O N O N O N O N O N O	•	bis(2-Chleressepropyl) ether					
***	2	4-Rethy   phenol			•		
==-nne3n==e=+nennn	=	H-Hitroso-n-Bipropylasine					
8-46834-E4246E444	13	Heasthloreelhane					
	=	Hitrobenzone					
44624-E624484444	=	Isopherene					
W#24=#24#	2	2-flitrophenel					
	*	7,4-Bisethylphenel					
24-24-24	~	Denzeit Acid					
M-E-2-08	=	his-(2-Chloroethony)methane					
	£	7,4-Bichleraphenel					;
	2	1,2,6-Trichlerobenzese					
	2	-					
		_					
	23	Henachlorobutadiene					
	*	4-Chlore-3-sethylphenol					
	22		!	1		•	:
	*	Menach lor ocyclopentadiene					
-	23	2,4,6-Trichleraphenol					
	2	7,4,5-Trichlorophenol					
	۶.	2-[h] or on aphit halene					
	2	2-Nitrosailine					

## Ground Water Sensyolatiles

•	ادا	SITE	BLAKK	SITE L	SITE 6	SITE 6	SITE B	BLANK	SITE (	SIIE I	SITE 1	SITE I	SITE I	SITE I	SITE I	BLANK	SITE I	\$115 6
•	[4]	SAMPLE MUMBER MELL MUMBER DATE SAMPLED	BC-SH-17+ 3-17-07	DC-6V-18 EE-6108 3-10-87	DC-GU-19 EE-G107 3-10-07	BC -6W - 200 EE -6107 3-18-07	DC-GH-21 EE-05 3-10-07	9C-GN-22+ 3-10-87	DC-GN-23 EE-13 3-23-07	DC-GH-24 EE-12 3-23-07	BC-GH-25 EE-6112 3-23-97	DC-GH-26 EE-14 3-23-87	DC-GH-27 EE-15 3-23-87	DC-GM-20 EE-16 3-23-07	DC-GN-29 0 EE-12 3-23-07	BC: GM-30+ 3-23-87	PC-GH-31 EE-20 3-23-87	DC-6W-77 EE-11 3-14-97
•	•	1 Dimethyl Phthalate 2 Acemaphtylone 3 3-Mitroaniline	· <del></del>				,											98
		4 Acenaphthene 5 2,4-Binitrophenol 4 4-Hitrophenol 7 Bibenzefuran																
•	• • • • • • • • • • • • • • • • • • •	8 2,4-Binitrataluene 9 2,6-Binitrataluene 10 Diethylphthalate 11 4-Chlorophenyl-Phenylether									23 B		13 0	140 B		13.6	0 F.	J
•	gen 100 100 100 100	12 Fluorene 13 4-Mitroaniline 14 4,6-Dinitro-2-methylphenol			-									25 J				
•		15 M-Hitrosodiphenylagine 16 4-Bramphenyl-phenylether 17 Hexachlorobenzene 18 Pentachlorophenol	. = .		1300 J	6300	6 J 12 J				4.3	2400	7.1	<b>10</b> 1				
•		19 Phenanthrene 20 Anthracene 21 Di-n-butyl phthalate 22 Fluoranthene		9 91	•		10 0		2 JI	7 83	2 38	ı	2 J <b>9</b>			2 JB	<b>4</b> 9.	ı
•		23 Pyrene 24 Butyl Benzyl phthalate 25 3,3 -Dichlorobenzidine 26 Benzola)Anthracene						• • •										
•		27 bis(2-ethylhexvl) phthalate 28 Chrysene 29 Bi-n-octvl phthalate		18 D			10 B	4 83	2 JI	5 83	3 <b>JI</b>	I	2	20 BJ		2 J <b>9</b> 1 J	3 83	!
•	l. 	30 BenzofbiFluoranthene 31 BenzofbiFluoranthene 32 BenzofajPyrene 33 Indenoff,2,3-cdjPyrene																
•	4.	34 Benzo(g,h,z)Perylene 35 Bibenz(a,h)Anthracene																

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		74144	

9 3115

																52 Benzelestyrene 54 Benzeles, 1,3,75 celstyrene 55 Bibenzeles, 1,3,19 crylene	2
											•					3) Benta(k)Fluoranthene	
	<b>6</b> 11		4 Z									2 81			re z	24 B1-n-actyl phthalate 34 Benza(b)Fluoranthene	
	• • •	•	•								,					SB Chrysone	
		1	2 10								1	14 Z			M +	3) pre(3-ethylpenyl) buthelete	Ł
																24 Beate(4)Anthracens	
																25 3,3'-Bichlorobenzidine	
											ļ					34 priki povski bylyvirje 32 ikteve	
																22 Fluoranthene	
	€ 61	11	0 01							1 7		ra 1			e zi	2) Di-m-buty) phihalate	
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																14 Phonas throne	
							32 1						•			longdevaldasines el	
																17 Herachlorobenzene	-
																16 4-Brosophenyl-phenylether	-
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																l2 Fluorene l3 4-Nitreaniline	
																ii 4-Chiaraphenyl-Phenylether 13 Elucean	
																o Biethylphthalate	
																4 2,6-Binitrateluone	
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																3 S-Alfreentline 3 Acorobylylane	
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1-34-83	2-54-83	10-01-1	2-54-03	10-41-L	2-54-81	18-11-1	2-54-81	10-11-1	1-24-07	2-54-83	2-54-03	18-52-5	10-41-1	2-54-03	2-54-03	6374WS 31V6	
\$2-33	12-33	<b>12-33</b>	12-33	£-33	EE-32	22-33	22-33	12-33	12-33	6019-33	0119-33		2019-33	2019-33	9019-33	NELL MUNER	
DC-68-43	1 26-RS-31	V(1-05-30	Th-MS-30	VO+-N5-34	00-R9-36	BC-EN-26V	DC-69-24	EC-68-289	DC-88-30	9C-89-23	DC-88-29	9C-6N-22 +	DC-68-249	PC-69-34	EC-661-22	V30MN 31ANS	

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1 Breetly! Pathalate 2 Accessives 3		:	,		; ! !	, - 							,	i	
19 Pentachlorophonol 19 Phenathrono 20 Anteraces 21 Din-butyl phihalate 22 Fluorathono 21 Contact				:		-		<b>1</b>					•	:	
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28 Chrystne 29 Bancethj phthalate 39 Benzelbjiuorathene 31 Benzelsjijuorathene 32 Benzelajprene 33 Indeno(1,2,3-cdipvene 34 Benzelg,h,ijferylene 35 Bibenzia,hjfathracene			7		<b>3</b>	<b>.</b>			?	7 2		2	•	•	
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	SITE		ITE O	SITE 0	SITE 0	SITE N	SITE N	SITE N	SITE H	SITE 6	SITE 6	SITE 6							
•	SAMPLE NUMBER	n DC- EE-	-66-81 -66 16-87	DC-GN-02 EE-07 3-16-07	BC-GN-03 EE-09 3-16-07	9C-6W-04 EE-10 3-14-87	DC-GN-05 EE-17 3-14-07	9C-GH-04 EE-00 3-14-07	BC-GH-07 EE-19 3-14-07	BC-GH-008 EE-19 3-16-07	BC-GM-09 EE-18 3-16-87	BC-6M-10 EE-01 3-17-87	DC-GN-11 EE-02 3-17-87	BC-6W-12 EE-03 3-17-07	BC-60-13 EE-04 3-17-07	BC-66-14 EE-6101 3-17-87	BC-60-15 ` EE-6103 3-17-67	BC-6W-16 EE-6104 3-17-87	•
•	1 Binethyl Ph 2 Acenaphtyle												6.1						
- }-	3 3-Hitrocail	ine	•						3900		446 J								
•1	5 2,4-Dinitra 6 4-Hitrophen	phenol									80 J								
	7 Dibenzofura 8 2,4-Dinitro	toluene										4.3							
•	., 9 2,6-Binitro 10 Bzethylphth	alate											22 J						
,	12 Fluorene											29 J							
	** ***********************************	-2-sethylphenol										***							
	15 M-Hitrosodi 16 4-Orocophen 17 Hezachlorot	vl-phenylether										800						ž	
	17 Measchlored 18 Pentachlored 19 Phenanthren	phenol	•••	-					74000 E	22000 E	310	630 15 J			•				
	20 Anthracene 21 Di-n-butyl		12 BJ	8 83	5 BJ	<b>8</b> 9J	5 BJ	5 84	1			13.4					7 DJ		
	22 Fluoranthen 23 Pyrene																		
	24 Butyl Benzy 25 3,3'-Dichle	robenzidine			-														
		hracene hezyl) phthalate	95	160	32		78	<b>.</b>					24 J			32		74	
	28 Chrysene 29 Bi-n-octyl			7 J	4.3			2 1								<b>6</b> )			
	39 Benze(b)Flu 31 Benze(b)Flu 32 Benze(a)Pvi	or an thene					,												
•	33 Indeno(1,2,	3-cd)Pyrene																	
	35 Dibenz(a,h)																		
	45																		
	47																		
	40																		
	31																•		

## Ground Mater Pest/PCDs

		PITE	SITE 0	SITE 0	SITE O	SITE 9	SITE 8	SITE D	SITE O	SITE 0	S11E 0	SITE N	SITE N	SITE #	SITE H	SITE G	SITE 6
	4	SAMPLE NUMBER WELL NUMBER DATE SAMPLED	DC-60-01 EE-04 3-16-07	BC-60-02 EE-07 3-16-87	BC-64-03 EE-09 3-16-87	DC-GN-64 EE-10 3-16-87	DC-64-05 EE-17 3-16-87	BC-GN-06 EE-08 3-16-87	BC-Qu-07 EE-19 3-16-87	BC-6H-08 1 EE-19 3-16-87	DC-GH-09 EE-10 3-16-87	BC-GH-10 EE-01 3-17-B7	BC-GN-11 EE-02 3-17-87	DC-60-12 EE-03 3-17-07	9C-6N-13 EE-04 3-17-67	OC-60-14 EE-6191 3-17-07	3-17-0) EE-6103 3-17-0)
	•     •     •     •     •	1 Alpha-BHC 2 Beta-BHC 3 Belta-BHC 4 Goona-BHC (Lindone) 5 Heptachler		•													
	••	6 Aldran 7 Heptochlor Eponide 8 Edosulfan 1 9 Dieldran 10 4,4'-DDE															
· •	1   18	11 Endrin 12 Edosulfan II 13 4,4'- <b>000</b> 14 Endosulfan Sulfate 15 4,4'- <b>00</b> T															
		15 Methonychlor 17 Endrin ketone 18 Chlordana 19 Tonaphone 20 ARGCLOR-1015			. •		<del></del>	an dama di Pari									• .
	27 28 29	21 ANDCLOR-1721 22 ARDCLOR-1232 23 ARDCLOR-1242 24 ARDCLOR-1248															
	12	25 AROCL OR - 1254 26 AROCL OR - 1260							-			52					14 J

	Ground Water Pest/PCBs															
_('	SITE	SITE 6	"BLANK	SITE	SITE 6	SITE 6	STIE 8	STWK	SITE 1	SITE I	SITE I	SITE I	SITE I	SITE 1	SITE 1 "	DL ANK
	SAMPLE MUNDER MELL MUNDER BATE SAMPLED	BC-88-16 EE-6104 3-17-87	BC-60-17+ 3-17-87		9C-GU-19 EE-G107 3-10-87	DC-64-20 0 EE-6107 3-18-87	9C-68-21 EE-05 3-10-87	BC-68-22 + 3-18-87	BC-GU-23 EE-13 3-23-87	BC-GU-24 EE-12 3-23-87	BC-6H-25 EE-6112 3-23-07	DC-GH-26 EE-14 3-23-07	BC-GH-27 EE-15 3-23-87	BC-GU-28 EE-16 3-23-87	BC-68-29 0 EE-12 3-23-07	DC-68-36 •
	1 Alpha-BMC 2 Beta-BMC 3 Belta-BMC 4 Gamma-BMC (Lindone)	. <u></u>	-· - ·												s debt	•
	5 Neptachler 6 Aldrin 7 Neptachler Eposide 8 Edossifan I															
	9 Bieldrin 10 4,4'-996 11 Endrin 12 Edosulfan II 13 4,4'-908															
	14 Endoulfan Sulfate 15 4,4'-90T 16 Methoxychlor 17 Endrin Ketone								•							
	16 Chlordane TY Texaphene 20 ARCCLEM-1016 21 ARCCLEM-1221							· · · · <del>- ·</del>								
•	22 ARDCL OR - 1232 23 AMOCL OR - 1242 24 ARDCL OR - 1240 25 AMOCL OR - 1254		- · <del></del> ·				<del></del>	•								
	26 AMBCL BM - 3 260				890	<b>450</b>	·									
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#### Ground Mater Pest/PCBs

11 Endrin 12 Edosultan II 13 4,4"-900 14 Endosulfan Sulfate 15 4,4"-807 14 Nethoxychlor 17 Endrin Ketone IS Chlordane 17 Toxaphene 20 AMBCLOR-1014 21 MOCLER-1221 22 ARBCLOR-1232 23 AROCLOR-1242 24 ARQCLOR-1248 25 AROCLOR-1254 26 AROCLOR-1260

SITE	\$116 1	SITE 6	\$11E \$	S 3118	SITE 6	BLANK	SITE N	SITE L	SITE O	SITE 0	SITE 0	SITE 0	SITE 0	SITE 0	SITE O
AMPLE NUMBER ELL NUMBER ATE SAMPLEB	9C-60-31 EE-20 3-23-67	8C-80-32 EE-11 3-24-87	BC-60-33 EE-6106 3-24-87	9C-6U-34 EE-6102 3-24-87	DC-6U-34A EE-6102 7-14-87	9C-99-35 + 3-24-97		9C-GN-37 EE-6109 3-24-87	9C-60-30 66-21 3-24-87	DC-GU-38A EE-21 7-14-87	DC-GN-39 EE-22 3-24-87	DC-GN-39A EE-22 7-14-07	DC-6N-40 EE-23 3-24-87		BC-6N-41 EE-24 3-24-87
Alpha-BIC			70 C												
Beta-BKC															
Del ta-BMC															
Sames-SMC (Lindane)													•		
Heptachlor															
Aldrin															
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	uround mater restreces																
- -(1 -	- SITE	SITE 0	BITE 6	SITE O	SITE 0	SITE #	STIE R	SITE R -	SITE R	SITE A	SITE R	SITE A	DL AMY	PRIVATE	PRIVATE	PRIMITE	PRIVATE
	SAMPLE NUMBER WELL NUMBER DATE SAMPLED	DC-GU-41A EE-24 7-14-87	BC-60-42 4 EE-24 3-24-87	9C-GN-43 EE-25 3-24-87	BC-GM-43A EE-25 7-14-87	9C-60-44 P-1 3-25-87	BC-68-45 B-28A 3-25-87	BC-90-44 P-7 3-25-87	BC-64-47 B-24A 3-25-87	BC-60-488 B-26A 3-25-87	BC-68-49 B-25A 3-25-87	9C-GH-50 P-11 3-25-07	OC-GN-51+ 3-25-07	BC-64-52 WRIGHT 3-26-87	BC-GM-53 SETTLES 3-24-87	BC-GH-54 SCHNEDT 3-26-87	DC-6M-55 RcBONALT 3-26-67
	1 Alpha-BMC 2 Beta-BMC 3 Selta-BMC 4 Game-BMC (Lindane)																
	5 Heptachlor 6 Aldrin 7 Heptachlor Epezido 8 Edosulfan I														·		
	9 Dieldrin 10 4,4°-BBE 11 Endrin 12 Edosulfan II																
10 mg 15 M 12 M 12 M	13 4,4° <b>-000</b> 14 Endosulfan Sulfate 15 4,4° <b>-00</b> T																
• -	16 Methoxychlor 17 Endrin Ketone 18 Chlordane 19 Texaphene					÷	* ***************	· ·								<del></del>	
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## Ground Mater Pest/PCBs

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	,	SAMPLE NUMBER	DC-69-54	BC-8H-57 +	
ŀ.	4	HELL MUMBER	CLAYTON		
	٠	BATE SAMPLED	3-26-87	7-14-87	
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- 1	•	17 Endrin Ketone			
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	i —	19 Toxaphene			Mark Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the C
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0 Vanadium 1 Vinc 2 Cyanide	S Michel Selenius Selenius Selenius Thallus	2 Lead 3 Manganese	T COMBINE Chronium, trivalent Cobalt Copper Copper	Alusinus Antisony Artenic Brius Beryllius	SAMPLE HUNDER DATE SAMPLED	SITE
15% 25	•	1.29	2760	¥:	9C-64-01 EE-04 3-14-97	e aus
326	· 2	<b>8</b>	<b>5</b>	<b>5</b> 8	8C-8H-92 EE-97 3-16-87	1.20
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25		1030		26	9C-6M-12 EE-03 3-17-87	N 311S
24		1900			9C-6H-13 EE-04 3-17-97	SITE II
31	· .	2730	-	219	9C-Gu-14 EE-6161 3-17-67	SITE 6
42	-	<b>242</b>		; 53 #	9C-6H-14 9C-6H-15 EE-6161 EE-6167 3-17-67 3-17-07	s aus

#### Ground Nater Inorganics

_1			SITE	SITE S	PLANK	SITE L	SITE 6	SITE 6	SITE 6	R MK	SITE 1	BITE I	SITE I	SITE I	SITE I	SITE I	SITE 1	BIL ARMY
•		•••	SAMPLE MUMBER WELL MUMBER BATE SAMPLED	BC-68-16 EE-6104 3-17-07	OC-60-17 +	BC-60-18 EE-6100 3-10-87	BC-GH-19 EE-6107 3-10-87	OC-00-20 0 EE-6107 3-10-07	DC-GN-21 EE-05 3-10-07	9C-6H-22 + 3-10-07		BC-80-24 EE-12 3-23-87	DC-GU-25 EE-G112 3-23-07	DC-60-26 EE-14 3-23-07	DC-GH-27 EE-15 3-23-07	DC-6N-20 EE-14 3-23-87	DC-GH-29 EE-12 3-23-87	0 BC-GH-30 + 3-23-87
	•   -		Aluciano															
			Antioony															
	•	1	Arsonic				14	12			12		20	15	12			
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اھ		Š	Seryllius				•10						•••			•••		
T <sub>i</sub>	ان	Ĭ	Boron															
1		ž	Cadeise				27 R	22 R										
			Chronius, trivalent				24	23										
			Cobalt				500	572										
١.	14,		Copper															
			iron	1110		21900	247000	241000			25400	23300	10000	24100	19500	<b>954</b> 0	24900	107
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ı	1-1		Hanganese	103		1290	7240	4834	- 204		1520	1550	1650	1260	1270	1750	1580	
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# INDRGAMICS ERGUND-MATER

	SITE	SITE I	SITE 6	SITE 6	SITE &	811E 6	BLANK	SITE N	SITE L	SITE 0	SITE 0	SITE O	SITE 0	SITE 0	SITE O	SITE 0	0 3112
	MPLE MUMBER	BC-EN-31	BC-6N-32	IC-60-33	DC-60-34	DC- <del>CU</del> -34A	BC-BM-35	DC-6H-34	DC-GH-37	DC-60-30	DC-GN-38A	DC- <del>G</del> N-39	BC-GN-39A	9C- <del>SN</del> -40	BC-6N-40A	BC-60-41	DC-50-41A
WE	ELL MUNGER	EE-24	EE-11	EE-CIOF	EE- <b>6</b> 107	EE -6102		EE-110	EE- <b>6</b> 107	EE-21	EE - 21	€€-22	EE-22	EE-23	EE-23	EE-24	EE-24
BA	HE SAMPLES	3-23-07	3-24-07	3-24-07	3-24-87	7-14-87	3-24-07	3-24-87	3-24-87	3-24-07	7-14-87	3-24-87	7-14-87	3-24-87	7-14-87	3-24-87	7-14-67
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	larina .			192	40	(51)		173		159	[35]	534	500	(161)	(157)	[170]	264
	lery) Liun																
	lorga																
	aderue								32			•	11				
	bromium, trivalent			41													
	obalt					[10]	•		84								
	opper																
11 1		124	43800	47500	3850	2860	111	2160	523000	20400	15900	147000	171000	19400	14 <b>8</b> 00	34400	29200
12 L											3270		6350				
	langanese		2270	3740	1460	1510		274	7660	4340		5460		1270	1330	4110	1520
	lercury																
	lickel			37	72			111									
	se len i un																
	islver																
	hallayo																
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21 1			129	58	14	31	10	53	2210	41	57	101	40	75	[15]	23	24
27 (	Cyanide		26							20							

•	cl		~ <b>S</b> ]	TE	SITE 0	SITE W	SITE 0	SITE R	SITE R	SITE #	SITE 8	SITE #	SITE #	SITE R	BLANK	PRIMIE	PRIVATE	PRIVATE	PRIVATE	PRIVATE	PL ANY
•					DC-60-42 1 EE-24	BC-8N-43 EE-25	DC-GH-43A EE-25	BC-68-44 P-1	DC-GH-45 B-204	BC-60-46 P-7	DC-GN-47 D-26A	BC- <b>GN-40</b> B-26A	BC-6N-49 B-25A	9C-6N-50 F-11	BC-GH-51+	BC-GN-52 NREGNT	OC-GN-53 SETTLES	DC-GU-54 SCHNIDT	DC-GM-55 Nc BOMAL D	BC-6N-56 CLAYTON	<b>SC-GH</b> -57
	<u> </u>		DATE	SAMPLED	3-24-07	3-24-87	7-14-87	3-25-87	3-25-07	3-25-07	3-25-87	3-25-07	3-25-07	3-25-87	3-25-07	3-26-97	3-26-07	3-26-07	3-26-87	3-26-87	7-14-87
			Alu	ainea														**			
		2	: Ant	10009																	
•		3		9630	23			34	41		48	45		35				11	24		
Ì	]•{	•	Bar		[104]	141	[92]	440	{123}	{27}	[194]	201		[140]		(73)	[89]	297	[117]	300	
		5		yllius																	
i			Por			,															
_		,		loius 																	
•	111			onium, trivalent						120											
-	(1)		Cob							120											
	1		Cop		34400	3930	2360	14044	20800	15500	24900	27500		11800		2990	[10] 4600	115 21600	10600	17460	(87)
•	,		ire		20000	3734	7300	10000	20000	13300	20100	21300		31000	(91)	2770	12 R	21800 18 R	10000	1/400	(0/)
	, , ,		Lea		4306	2300	1320	2190	6840	11700	3320	3570		2640	(71)	1960	665	1660	257	1950	
_:			Her	ganese	7300	2300	1324	2170	5610	11244	3330	33/4		2040		1000	•••	0.2	237	1730	
			Nic							(10)								₩.2			
•				enius						(,											
	ازا		Sil																		
				llano																	•
	[]: —		Tin																		
أح	ı			, Jadius						(10)											
			lin		34	26	24	45 R	24 R	192 R	45 R	62 R		39 R	[10]	4140 R	2000 R	·377 R	1350 A		
	27;		Cya		•.		••		"	.,	-	•• •		14	,,	7.10 H	2000 "	•			
احا			,-																		

alt 91 autiliedl Bl 194118 (1 16 Selenius 15 Nickel 14 Mercury 13 Hanganese 12 fesq A01 11 10 Copper 116403 P 9 Chronium, trivalent 9410943 [ An Total S Beryllium mutine ! 3 WERNIE S Antioony auniaulà l

2) line 22 Cyanide 30 Asusqua

Ground Mater Inorganics

836NUN 3J9NA2 836NUN JJ3N 83J9NA2 3TA6

SITE	# 341S	2 3 E 4	8 3 1 S	5-			5	5	5-				
MIE STARTE	11-5-8	11-2-07	11-5-84	98-5-11 98-98-98	11-5-96	· 11-5-04	11-5-06		11-5-06 06-88-08	11-5-86 11-5-86 11-5-86 11-5-86	_	11-5-06 11-5-86	11-5-06 11-5-86
1 Chlorosethane													
2 Presenthane 3 Vinyl Chloride		ţ	•										
4 Chloreethane													
5 Methylene Chioride	<u>•</u>	1	3 22 3	3 &	Ξ 	3 2	_	u E	2	=	=	=	=
& Accione	12 0	•		•	≂			= =	=		I3 <b>•</b>	I3 <b>•</b>	
7 Carbon Disulfide													
0 1,1-Dichloroethene		1				,							
7 1,1-Bichlersethane													
11 Chlorofora	27	,										23	25
13 2-Butanene (ARR)									-		·		
_	•												
17 Propodichleresethane													
19 trans-1.3-Dichloropropene	***************************************												
20 Trichloraethene	•	•	,										
_													
22 l <sub>1</sub> 1,2-frichloroethane 23 Denzeme	-												<u>-</u>
24 cis-1,3-Bichleroproprie	3												
	Ĭ,	<i>i</i>											
27 4-Methyl-2-pentanone													
30 1,1.2,2-Tetrachloreethane	hane												
33 Ethylbenzene													~
30 Bigrone													

## Surface Nater Seasvolatiles

	SITE	DLANK -	SITE N	N 3112	CS-0	CS-0	CS-8	CS-C	CS-C	CS-D	CS-D	<b>SLAW</b>	CS-A	CS-A
	SAMPLE MUNDER	DC-\$W-01 +	BC-SN-02	DC - SM - 03	BC-SN-04	BC-SW-05	DC-SU-04 1	DC-SN-07	BC-SN-08	DC-SW-69	DC-SH-10	DC-SW-11 +	DE-SH-12 +	DC-SW-13
	MIE	11-5-06	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	11-6-86	11-4-84	11-6-86
ı	Phenol													
2	bis(2-Chieroethyl)ether	. —					•						• • •	
3	2-Chlorophenol									•				
4	1,3-Bichlorobenzene													
5	1,4-Bachlorobenzene													
٠	Denzyl Alcohol													
7	1,2-Bichlorobenzone						_							
	2-Methylphenal	_					-	•						
•	bis(2-Ch)erossoprepyl) ether													
10	4-Methylphenel													
11	N-Hitroso-n-Dipropylamine													
12	Herachiorouthane													
13	Ni trobenzene													
14														·
	2-Hitr <del>opheno</del> l													
16	2,4-Bioethylphenol													
17	Benzoic Acid													
10	bis-(2-Chloroethoxy)nethane													
17	2,4-Bichlorophenul													
20	1,2,4-Trichlarabenzene						•							
21	Naghtha lene													
22	4-Chloroan: line				•								3 1	
23	Hexachiorobutadiene													

25 2-Methylnaphthalene
26 Hezachlorocyclopentadiene
27 2,4,4-Trichlorophenol
28 2,4,5-Trichlorophenol
29 2-Chloronaphthalene
30 2-Mitroaniline

24 4-Chiora-3-methyiphenal

\$116	F. ARK	# 311 <b>5</b>	N 3118	1-53	1-50	7-50	J- <b>5</b> 3	J-93	<b>6-5</b> 3	<b>(-</b> 5)	¥ 14	V-53	V-53
SAPLE NUMBER Date	50-58-91 + 11-2-56	BC-58-02 11-5-86	DC-58-03 11-5-06	DC-516-04 11-5-96	EC-58-65 11-5-86	BC-58-06 1	EC-511-07	DC-58-00 11-5-94	BC-58-09 11-5-86	DC-54-10 11-5-66	DC-58-11 + DC-58-12 11-6-66 11-6-66	DC-58-12 11-6-06	C-58-12 BC-58-13 1-6-06 11-6-06
1 Disethyl Phthalate	1	i				į							
Z Mcmaphtylene													
	1												
5 2,4-Binitrophonol	١				•								
6 4-Hitrophenol													•
7 Dibenzofuran	1				,								
8 2,4-Binitreteluene	)												
10 Diethylphthalate							_	-					
_													
•						:							
15 M-Hitrosodiphenylamine													
16 4-brosophenyl-phenylether													
17 Hezechlorobenzene													
_													
_	;											•	
_													
	5	<b>9</b>	2	=	15.	:	=		2	2	17.8	2	1 27 1
27 Flooranthens													
												12 )	
_													
_												•	
-												•	0
		-								-		2	-
_										•		•	•
31 Denzo(k)Fluoranthene													
32 Beazela)Pyrene													
33 Indene(1,2,3-cd)Pyrene													
34 Denze(g,h,:  Perylene													
_													

<u>Grand Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the</u>

١	SITE	DL ANK	BITE H	SITE N	CS-0	CS-0	CS-D	CS-C
	SAMPLE MUMBER MATE	9C-\$N-01 + 11-5-86	BC-SN-02 11-5-66	9C-5N-03 11-5-66	DC-SW-04 11-5-86	BC-SN-05 11-5-86	BC-SW-84 1 · 11-5-84	DC-SM-07 11-5-04
1	Alpha-BHC							
2	Deta-DIC							
3	Belta-BHC							
4 5	Gamma-BMC (Lindane) Meptachler		-					
•	Aldrin							
7	Heptachlor Epoxide Edosulfan I			· -			÷	
9	Bieldrin				-			
10	4,4"- <b>00</b> E							
11	Endrin							
12	Edosulfan II							
13	4,41-000							
14	Endosulfan Sulfate							
13	4,4°- <b>00</b> T							
16	Hethoxychlor							
17	Endran Ketone							
18	Chlordone							
17	Tozaphene		- •					
20	AMOCLOR-1014			-				
21	ARGCL 60-1221							
22	MMGCL GM-1232							
23	ARDCLOR-1242							
24	AROCLOR-1248							
25	AROCLOR-1254							
24	ARGELOR-1760				3.4	34	44	

11-6-86

11-6-86

11-5-86

CS-C

11-5-86

CS-B

11-5-84

## Surface-Nater Inorganic

	SITE	BLANK	SITE W	SITE M	CS-D	CS-0	CS-8	CE-C	CS-C	CS-9	CS-D	<b>BLANK</b>	CS-A	CS-A	_ · · · · · · · · · · · · · · · · · · ·
	SAMPLE MUMBER BATE	0C-50-01 + 11-5-86	8C-9H-02 11-5-86	BC-50-03 11-5-06	BC-8N-04 11-5-06	DC-50-05 11-5-04	BC-50-06 0 11-5-86	BC-50-07 11-5-86	9C-6H-06 11-5-06	BC-SU-09 11-5-86	9C-SW-10 11-5-86	DC-SW-11 + 11-6-86		DC-50-13 11-6-86	
1	Aluezaue		441		1090	204	9080		767	5000	1190	252	354	294	
2	Anticony												115		
3	Arsenic						31								
4	Barina		300				7130			274					
5	Beryllaus														
6	Boren														
7	Cadesus						25 99			9.1			75	23	
	Chronium, trivalent	l	14				97			12			01	65	
	Cobalt														
	Copper		51	44	640	239	17700	226	84	419	57		7030	2410	
	Iron	255	937	350	1510	495	24500	520	2790	7470	1570		2040	724	_
	Lead		6.4		17	17	1300	710	30	89	36		3060	76	·
	Hanganese		, 97	95	190	46	222	141	234	196	20		48	252	
	Hercury				1.6			1.7	♦.2	0.26			0.59	0.2	
	Nickel		44				1500	<b>8</b> 3		189			2600	447	
	Selenius														
	Silver												14		
	Thellium														
	Tan		_				60		44				499		
	Vanadius														
	linc		186	73	464	302	10300	537	247	1090	185		1450	480	
22	Cyanide														

# Sediment Volatiles

\$11E	CS-0	CS-D	SITE N	SITE N	SITE N	CS-9	CS-9	CS-B	£\$-£	CS-C	CS-E	CS-C	CS-9	CS-D	[S-0	
SAMPLE MUMBER	DC-50-13 1	DC-50-14	OC-50-15	DC-SD-16	9C-50-17	OC-SO-10 \$	DC-SD-17	BC-SB-20	DC-SD-21	DC-50-22	DC-50-23	BC-SB-24	DC-50-25	OC-SD-24	DC-50-27	
SAMPLE BEPIN	0-4"	2'-3'	6-6"	0-6"	u-4°	0-6"	0-4"	1.5'-2'	0-6"	2'-2.5'	Ú-4"	2'-2.5	0-4"	1.5'-2'	4-4	
BATE SAMPLED	11-5-66	11-5-66	11-5-04	11-5-06	11-5-86	11-5-86	11-5-84	11-5-84	11-5-86	11-5-84	11-5-84	11-5-84	11-5-86	11-5-B6	11-5-86	
Chierecethane		<del></del>	•		-											
Bronnethane																
Vinyl Chloride		-														
Chloroethane																
Hethylene Chloride	11000 B	2204 B	7800 B	10000 \$	8400 B	12000 B	13000 \$	14000 B	19000 B	19000 B	27600 B	17000 8	23060 B	19000 3	43000	
Acetone	15000 8	820		51 <b>00 B</b>	5400 B	4100 JB	10000 8	€ 0014	1400 B	9900 B	15000 B	7300 B	10000 D	9800 8	2000	,
Carbon Bisulfide																
1,1-Dichloraethene																
1,1-Dichloroethane																
trans-1,2-Bichloroethene Chloroforo											-					
1-2-Dichloroethane																
2-Butanene (MEK)	21 <b>000</b> D	510	11000	14000	13000	14000	14000	10000 3	11000 B	14000 B	22000 B	12000 B	21444		75.444	
1,1,1-Trichloroethane	71000 P	210	11400	14000	13000	14000	14000	100/0 9	11000	14000 B	22000 B	12000	21000 P	14000 B	35000	•
Carbon Tetrachioride								•								
Vinyl Acetate																
Bronodichloromethane																
1,2-Bichloropropane																
trans-1,3-Dichloropropone															· •	
Trichloroethene																
Dibrosochlorosethane															-	
1,1,2-Trichlorgethane																
Benzene		07 J												*		
cis-1,3-Bichloropropene		• •														
2-Chloroethyl Vinyl Ether																
Breesfors																
4-Methyl-2-pentanone		220 J														
2-Mezanone		-					52000 B			1200 J						
Tetrachloroethene																
1,1,2,2-Tetrachloroethane																
Toluene		810													•	
Chlorobenzene		5200														
Ethylbenzene		3400														
Styrene															- •	
Total Tylenes		110														

#### Sediment Volatiles

	SITE	CS-9	PLMK	<b>BLANK</b>	CS-A	CS-A	CS-A	CS-A	CS-A
	SAMPLE MUMBER	DC-59-20	DC-50-29 <	DC-SD-31	DC-5D-32	DC-SD-33 1	9C-S0-34 I	DC-SD-35	DC-50-34
	SAMPLE BEPTH	1.5'-2'			1.51-21	0-4"	0-6"	0-4"	1.51-21
	DATE SAMPLED	11-5-84	<b>-11-5-86</b>	11-6-06	11-6-06	11-6-86	11-6-06	11-6-86	11-6-96
1	Chlorocethane		<del>-</del>						
2	Broose thane								
3	Vanyl Chloride		_						
4	Chloroethone								
5	Methylene Chloride	20000			14000 B	€300 B	4460 B	8800 B	7200 B
•	Acetone	7400	B 6200 (	4700 B	11900 D	12000 B	5300 B	23000	4800 9
7	Carbon Bisulfide								
•	1,1-Bichlorgethene								
10	1,1-Dichloroethane trans-1,2-Bichloroethene								
11	Chlorofore								
12	1-7-Bichloroethane								
13	2-Butanene (MEK)	15000	B 11000 I	5400 à	12000 B	11000 B	7200 B		12000 B
14	1,1,1-Trichloroethane	1,000	11000	, ,,,,,,	11444 1	11000 5	7200 5		12000 #
15	Carbon Tetrachloride							,	
16	Vinyl Acetate							•	
17	Brandschlorenethene								
10	1,2-Bichloropropage								
19	trans-1,3-Dichloropropene								
26	Trachloroethose								
21	Bybrosechleresethane								
22	1,1,2-frichloroethane		*						
23	Benzene								
24	cis-1,3-Bichloropropone								
25	2-Chloroethyl Vanyl Ether								
26	Brassiere								
27	4-Hethyl-2-pentanone								
20	2-Hexanone						930 JB		
29	Tetrachloroethene								
30	1,1,2,2-Tetrachioroethane								
31	Teluene							•	
32	Chlorobenzene								480 J
33	Ethylbonzene								
34	Styrene								
75	Total Tylenes								

	26 A Tracky importantese 26 Heachler expelopentations 27 2,9,5-Trichler ephasol 28 2,9,5-Trichler ephasol 29 2-Chler on aphthalene 30 2-Hitrosniline	20 1,2,4-frichlersbenzese 21 Highthalese 22 4-Chlorosaline 23 Merachlersbeldiese 24 4-Chloro-3-sethylphese 25 7-defidinashthales	14 Isopherone 15 2-Bitrophenol 16 2,4-Binethylphenol 17 Denzoic Acid 18 bis-{2-Chloroethoxyleethane 19 2,4-Bichlorophenol	0 2-Methylphenel 9 bis(2-Chloreuseprepyl) ether 10 4-Methylphenel 11 M-Mitrose-n-Diprepylasine 12 Werschlereethane 13 Mitrobenine	1 Phonel 2 bis(2-Chloroethyllether 3 2-Chlorophonel 4 1,3-Bicklorophone 5 1,4-Bicklorophonen 6 bong1 Alcohol 7 1 2-Bicklorophonen	SAMPLE MUMBER SAMPLE MUMBER	3118
		<b>.</b>			; <b> </b> i	PC-53-13 (	2
		# # # # # # # # # # # # # # # # # # #			779000	EC-59-14 2:-3: 11-5-06	3
						0-6°	# 311S
						0-6° 0-6° 0-89-16	3118
						PC-58-17 0-6*	811E
	,	3	<u> </u>			11-5-84	C2-1
		1 02 1 1 02 1			<b>.</b>	9-6- 0-6-19	CS- <b>+</b>
		76 2				0C-60-20 1.5'-2'	C\$-
						9C-\$9-21 0-6* 11-5-86	1-83
	: :	266 J 330 J			7 36 1 10 1	DC-59-22 2 -2.5 11-5-84	0-83
		7 93 T			¥	0C-50-23 0-6"	C9-C
		5			=	0C-58-24 2*-2.5*	J- <b>S</b> 3
						BC-59-25 9-6*	CS-)
i					. :	90-58-26 1.51-2 11-5-86	<u>:</u>

## Sediment Semivolatiles

	SITE	CS-D	CS-0	DLANK	<b>BL ANK</b>	(	CS-A	CS-A	CS-A	CS-A	CS-A
	SAMPLE MUMBER SAMPLE BEPTH BATE SAMPLEB	9C-58-27 9-6* 11-5-86	9C-50-28 1.5'-2' 11-5-86	8C-58-29 + 11-5-86	9C-50-31		C- <b>\$0</b> -32 1.51-21 1-6-86	9C-SB-33 t 0-6" 11-6-86	DC-SD-34 8 0-6" 11-6-86	BC-58-35 0-6* 11-6-86	BC-SB-36 1.5'-2' 11-6-86
1	Phenol	-						*			
2	bis(2-Chloroethy1)ether										
3	2-Chierophene i										
4	1,3-Bichlorobenzene						160 J				550 J
5	.,						1000		410 J	130 J	2900
7	Benzyi Alcohol						480	270 J			
í	1,2-Dichlarabenzene 2-Nethylphenal						480	2/0 3			
:	bis(2-Chiorossopropyl) ether										
10	· · · · · · · · · · · · · · · · · · ·										
11	M-Mitroso-m-Biaropylamine										
12	Herachiornethane										
13										•	
14	Isophorone										
15	2-Nitrophenol										
14	2,4-01eethylphenel										
17	Penzoic Acad										
10	bis-(2-Chloroethoxy)sethane										
17	2,4-Bichlorophenel	-									
20	1,2,4-Trichlorobenzene						500			70 J	1500 J
21	Naghtha l'ene									130 J	
22	4-Chlormaniline									1000 J	
23	Hexachlorobutadzene										
24	4-Chioro-3-aethylphenol										
25	2-Nethylnaphthalene								450 J		
26	Hemochlorocyclopentadiene										
27											
	2,4,5-Trichlorophenol										
20	7-Chloresohthalana										

29 2-Chiorumaphthalene

30 2-Mitroaniline

	35 Dibenz(a,h)Anthracene	_	32 Open to the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the s		29 Ox-n-octyl phthalate	_	25 3,3"-Dichlorobenzidine 26 Denzo(a)Anthracene				20 Authracene		17 Menachiprobenzene	15 H-Hitrosediphenyleane 16 4-Dresophenyl-phenylether	14 4,6-Dinstro-2-aethylphenel	13 deliterateiline	11 4-Chlorophenyl-Phenylether	10 Diethylphthalate	7 7.6-Diastrataluene	7 Dibenzeturan	6 4-Bitrophenol	4 Accomplitions	3 3-Hitroshiltee	1 Digethyl Phthalate	BATE SAMPLED	SAMPLE MUNICIPALITY	512 512
			=	<b>.</b>		38 -																			11-5-26	Z-\$-3-	# ·
			Ī	3404 J	2 <b>40</b> 0 J	7500 1		1 3			1 800					39	<u>:</u>			;	¥				2'-3' 11-5-86	R-\$2-14	6
,					130 J					<b>.</b>		+												:	11-5-96	R-29-5	81 TE 11
					270 J	2 8 2				576 EJ															0-6" 11-3-86	X-99-16	# 11.15
						150 1		!		£								_							0-6* ·	R-63-17	=======================================
	I 600 J	58.	2 X		r 046		ŝ	f 020		7 × -														:	11-3-26	N-23-18 -	<b>G</b> -
	1908	Ē	¥	2100				ŧ					<b>.</b>												11-5-86	PC-52-19	3-
_	210 J		: :		2 E	3		:	<b>:</b>	<b>790 J</b>			21 <b>0</b> J				•								11-5-86	K-53-24	<b>1-8</b> -1
	2 %	590 J	<b>1</b> 2	<b>!</b>	900	740		46	:		290 J														0-6"	MC-SD-21	. S.)
	### J	4300	Ē	75.0			3300	4304	68	;	¥ =					370 3						r 01.1			2:-2.5: 11-5- <b>8</b> 6	DC-50-22	3.50
	1700 J		ŧ	200ú		£	•																		0-6*	AC-SA-23	D-C
-	476 1		38	1000	J 00 L		236 1	36	L 0(1	120 J	270 J														27-2.57	MC-530-24	1-53
			-				_			f 051		•													11-3-06	BC-SB-25	6.53
	•	100	<b>.</b>	200 J	85 1	: z	į	L 021	170	, ,,															1.5'-2'	RC-59-26	CS-1
			• · -			. <b></b>	;   				·	; ; ; ; ; =				-				-					1.	 - <u></u>	<del></del>

# Sediment Semivolatiles

3112	CS-0	CS-D	DLANK	DL ANK	CS-A	CS-A	CS-A	CS-A	CS-A
SAMPLE NUMBER	DC-50-27	DC-50-20	OC-S0-29 +	BC-SB-31		BC-80-33 \$	DC-50-34 I	DC-SD-35	DC-SD-36
SAMPLE BEPTH	4-4"	1.5'-2'			1.51-21	0-6"	0-4"	0-4"	1.5'-2'
DATE SAMPLED	11-5-86	11-5-86	11-5-86	11-6-86	11-4-86	11-4-84	11-6-96	11-6-86	11-6-86
1 Bisethyl Phthalate						•			
2 Acenaphtylene									
3 3-Hitroensiane									
4 Acenaphthene									170 J
5 2,4-Binitrophenol									
6 4-Hilrophenol	_								
7 Dibenzofuran						·			
8 2,4-Dinstrotoluene									
9 2,4-Dinitrotoluene									
10 Brethylphthalate									
11 4-Chlorophonyl-Phenylether									
12 Fluorene							-		
13 4-Mitrooniline									
14 4,6-Dinatro-2-methylphenol									
15 M-Hitrosodiphonylamine					220 J				
16 4-Brosophonyl-phenylether									
17 Hexachlorobenzene					110 J			1100 J	
18 Pentachlorophenol								800 J	
19 Phonanthrone					194 J				
20 Anthracene									
21 Da-n-butyl phtholate									900 J
22 Fluoranthene								500 J	
23 Pyrene					110 J			1000 J	1400 1
24 Butyl Benzyl phthalate				-	520		2400 J		
25 3,3'-Bichlorobenzidine									
26 Benzo(a)Anthracene									
27 bis(2-ethylhesyl) phtholate					2 <b>9</b> 0 J	2200 J	2900	130 1	
28 Chrysene					110 J		710 J	1000 J	1700 .
29 Da-m-octyl phthalate	170 J				300 J	420 J	2900	9100	11000
30 Benzo(b) Fluoranthene	500 J						220 1	760 J	1000
31 Benzo(k)Fluoranthene									
32 Benza(a)Pyrene	240 J							430 J	54ú J
33 Induno(1,2,3-cd)Pyrene	310 J							570 J	
34 Benzo(g,h,1)Perylene									
35 Dibenz(a,h)Anthracene	380 3							960 J	

25 AMOCLON-1250	beta-bec  belta-bec  belta-bec  belta-bec  beptackler  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindone)  legical (Lindon	SYMPLE ANDREA SYMPLE MENGER	\$11E
10300 J		00-59-13 t 1 0-6*	G-1
2 00099	<b>\$0000</b>	7'-3' 11-5-8-14	3-
1 <b>6</b> 50	'	0-6° 11-5-86	1 3115
	20000 98 30	0-6" 11-5-06 0-6"	81 7F M
27 <b>00</b> J	3200	0C-50-17 DC-58 0-6" 0-6" 11-5-06 11-5-	H 3115
		0-6" 11-3-06	5
¥ • • • • • • • • • • • • • • • • • • •		9C-59-19 0-6* 11-5-86	C-33
7, 60% 1,0001		9C-50-20 1.5'-2' 11-5-86	CS-1
•		0C-60-21 0-6" 11-5-86	J-SJ
9300 9300	8700	DC-SD-22 2'-2.5' 11-5-86	3-53
7800 11000		BC-SB-23 0-6" 11-5-86	3-83
r #91		DC-59-24 2'-2.5' 11-5-66	3-83
-	<b>€</b>	8C-50-25 0-6* 11-5-86	<b>C-</b> 33
	; ;	EC-59-26 1.5:-2: 11-5-86	<b>CS-1</b>
7508	i	0-50-27 0-6* 11-5-66	(S-)

sandifeet feetbet

3115	31	0-53	_ WV 70	Dr veix	V-53	)	V-S	V-S3	V-50	V-S)
314115	<b>#30M7M</b> 31al	02-05-30	+ 62-05-30	DC-20-21	-es-36 +	M	-29-22	PC-88-34	PC-29-32	DC-2D-29
374445	H1830 37a	1125.			112	)	. 9-(	.9-0	-9-0	1*25.
5 3144	(31-MVS 3	90-6-11	11-2-09	90-9-11	8-9-TT	11	98-9-	98-9-11	98-9-11	98-9-11
4= f A	JHE- PHC									
	)6[7-9](C									
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	indosulian Sultate 1,4°- <b>000</b>									
	104901									
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	sacton Ketone									
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	avaydexo									
ODW (	WOCT 88-1019									
WOO	WOCF OW-1551									
	WBC1 00-1525									
	MOC1 00 -1515				***	,	*****	*****		
	1300 08-1348 1400 08-1348	9061			210		0.191	11000	AAAIT	
	NADET DN - 1370 NAOET DN - 1324	9061			AC I	10	7200	00701	34000 i	

	SITE	CS-B	CS-0	SITE N	SITE N	SITE N	CS-0	CS-0	CS-D	CS-C	CS-C	CS-C	CS-C	CS-0	CS-D	CS-0	
	SAMPLE NUMBER	DC-50-13 #	DC-89-14	DC-SD-15	DC-50-16	DC-90-17	DC-50-10 1	DC-SD-19	DC-SD-20	DC-50-21	BC-SD-22	DC-S0-23	DC-SD-24	DC-SD-25	BC-SØ-26	DC-SD-27	,
	SAMPLE DEPTH	0-6"	53.	0-6.	0-4"	0-4"	0-6"	0- <b>6"</b>	1.5'-2'	0-4"	2'-2.5	0-6*	2'-2.5'	0-6"	1.5"-2"	0-6"	
	DATE SAMPLED	11-5-84	11-5-66	11-5-86	11-5-84	11-5-86	11-5-86	11-5-84	11-5-86	11-5-86	11-5-06	11-5-86	11-5-86	11-5-86	11-5-86	11-5-86	
1	Alusinus	4800	4300	6560	2430	7510	5300	9750	12900	12600	7530	8450	12400	11250	12500	6400	
2	Antimony																
3	Arsensc	14 R	20 R	3.6 R	12 🖷	16 A	16 R	21	13 R	5.1 R	9 R	33 €	30 R	3.2 ⋒	7.8 \$	4.7 R	
4	Barion	410	1110	154	131	196	467	17300	3120	376	570	1700	1010	239	♦22	214	•
5	Deryllium																
6	Boron																
7	Cadaina	22	34	1.5	11 37	•	24	30	0.2	17	34	27	42	12	42	23	
•	Chroniue, trivalent	62	153	15		. 53	79	110	113	41	60	54	40	33	48	34	
•	Cobalt	4.4	9.2	1.7	7.2	5	6	11	4.9	7.5	10	4.4	7.2	5	12		
10	Copper	8740 A	4700 B	147 1	1270 1	1780 \$	8440 8	15300 8	2410 #	580 1	5910 \$	6540 8	2440 8	379 \$	1630 8	1329 1	
11	lron	16400	19500	11100	26000	14400	14360	58200	21300	18400	18000	35 <b>80</b> 0	50900	22800	46290	31306	
12	Lead	<b>8</b> 53	931	26	45	71	983	1460	330	467	593	975	661	146	489	397	
13	Hanganese	197	153	100	97	139	210	82	70	177	16	161	151	190	273	170	
14	Mercury	♦.73	1.3	●.13	0.56	•	●.♥	1.40	4.87	6.71	0.95	1.44	2.81	ı	<b>∪.89</b>	0.34	
15	Mackel	56 RE	502 RI	356 RG	258 RI	307 Rt	82	1520 RI	867 RS	116 RE	839 RI	1290 RI	748 Rs	174 Rt	665 RB	537 Re	
16	Selenius	3.3	4.1				4	2					2.5				
17	Silver	10	11				14	15									
18	fhall sum							4									
19	Tin	32	26		23			16	-								
20	Vanadium	23	27	19		19	24	16	25	32	22	27	34	37	32		
	linc	3310	4450	848	872	1010	3410	11700	4410	1370	15400	6880	4430	1010	4590	2380	
	Cyanide		3.0		="												

V-\$3		V-53		4-53		¥-53		V-53		JF VMK		PF VMK		<b>1</b> -53	3119	ı
<b>₹C-69-2</b> ₹		PC-20-22		15-05-30	1	9C-29-22		25-89-25	. •	DC-20-21	٠	K-62-34		8Z-85-36	NAME HANDER	} 
1125.		.9-0		.9-0		.9-0		1*25.				_		1*25.	HI430 374WY	;
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															Beryllun Perso	
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П		ll				3.2		6.0						1.4	1(1993	-
10200 1	-	11400	•	2130		1720		2620		21		33			a <b>add</b> ag	• •
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910		1900		5930		0041		332		30		10		**	peal	
122		767		99		49		152				415		141	asavebuey	
81.1		2		54.6		46.4		18.5						01.0	Mercury	
307 #8	11	466	18	322	11	210	18	\$9L	11	161	18	81	18	539	Nictel	\$1
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12		22		32		92		9							J8A[15	
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				21 <b>)</b>		H		11		70		1.0			W1)	
22 22		2450		152 <b>0</b> 52		1210		1260		5Z		(41 (2		<u>/</u> 10	on i pe ue A	
44.47		2245		4677		4167				2/1		/41		414	Cyantde Zanc	

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December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December   December	DATE SAPPLED	11-10-0	# # # # # # # # # # # # # # # # # # #	11-11-06	E-1 11-11-08	11-11-66	11-11-66		1		D-3 11-11-06	C-3 11-11-16	<b>p-3</b> 11-11-96		11-11-09	
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Comparison Chiefe	Committee Chief   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.   St.		Chlorosethana 2 Prossethana 3 Vayl Chloride		:	į				*					•		<u>.</u>	
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4 1,3-Bichlerabensene	:	:			
5 1,4-Dichlorobencene					
6 Dentyl Alcohol					
7 1,2-Dichlorabearese				•	4
8 2-Nethylphenel					
9 bis(2-Chloreiseprepyl) ether					
10 4-Rethylphenel					-
11 H-Hitroso-n-Dipropylanine					
12 Nerachioraethane					
13 Withdeniese					
14 Isopherane					
15 2-Bitrophonei					
16 2,4-Bisethylphens!	•				
17 Benzosc Acid					
10 bis-(2-Chloroethoxy)acthase					
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27 2,4,6-Trichlorophonel					
28 2,4,5-Trichleraphenel	!		:		
29 2-Chipromaphthalone					
30 2-Hitrogailine					

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### Surface Soil Sectionalities

| Dischip! Phihalate  Remaphtyless  3.4-Binitrophissis  4.1-Binitrophissis  5.1-Binitrophissis  7.1-Binitrophissis  7.1-Binitrophissis  8.1-Binitrophissis  11.1-Binitrophissis  12.1-Binitrophissis  13.1-Binitro-2-estrylphessis  14.1-Binitro-2-estrylphessis  15.1-Binitro-2-estrylphessis  16.1-Binitro-2-estrylphessis  17.1-Binitro-2-estrylphessis  18.1-Binitro-2-estrylphessis  19.1-Binitro-2-estrylphessis  19.1-Binitro-2-estrylphessis  19.1-Binitro-2-estrylphessis  19.1-Binitro-2-estrylphessis  19.1-Binitro-2-estrylphessis  20.1-Binitro-2-estrylphessis  21.1-Binitro-2-estrylphessis  22.1-Binitro-2-estrylphessis  23.1-Binitro-2-estrylphessis  24.1-Binitro-2-estrylphessis  25.1-Binitro-2-estrylphessis  26.1-Binitro-2-estrylphessis  27.1-Binitro-2-estrylphessis  28.1-Binitro-2-estrylphessis  29.1-Binitro-2-estrylphessis  20.1-Binitro-2-estrylphessis  20.1-Binitro-2-estrylphessis  21.1-Binitro-2-estrylphessis  22.1-Binitro-2-estrylphessis  23.1-Binitro-2-estrylphessis  24.1-Binitro-2-estrylphessis  25.1-Binitro-2-estrylphessis  26.1-Binitro-2-estrylphessis  27.1-Binitro-2-estrylphessis  28.1-Binitro-2-estrylphessis  29.1-Binitro-2-estrylphessis  20.1-Binitro-2-estrylphessis  20.1-Binitro-2-estrylphessis  21.1-Binitro-2-estrylphessis  22.1-Binitro-2-estrylphessis  23.1-Binitro-2-estrylphessis  24.1-Binitro-2-estrylphessis  25.1-Binitro-2-estrylphessis  26.1-Binitro-2-estrylphessis  27.1-Binitro-2-estrylphessis  28.1-Binitro-2-estrylphessis  29.1-Binitro-2-estrylphessis  THE STATES                                     |
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| Acomphithme  2,4-Binitrophess  2,4-Binitrotalusse  2,4-Binitrotalusse  2,4-Binitrotalusse  3-Chiarophesyl-heaviother  4-Binitro-enthylphessi  8-Binitro-enthylphessi  8-Binitr | 1 Diselbyl Philbsi 2 Acrosphitylene 3 3-Bityassilliss |
| Illinate of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the contr | 4 Aconophthone<br>5 2,4-Dinitropher                   |
| 2,6-Binitrotoluene Birlhrj&klaiste  6-Chirophenyl-Phenylether Fluorene 6-Bironeliffor 4,6-Binitro-2-enthylphenol H-Bitroneliphenyl-asine 6-Broneliphenyl-phenylether Herschlerophenol Hadianthrone Anthrone Bi-n-butyl phthalote Fluorathene Pyrene Butyl Benyl phthalote Ty-Birlierophenyl phthalote Chrysene Bi-n-ctyl phthalote Chrysene Bi-n-ctyl phthalote Chrysene Bi-n-ctyl phthalote Chrysene Bi-n-ctyl phthalote Chrysene Bi-n-ctyl phthalote Chrysene Bi-n-ctyl phthalote Dense(1)Fluorasthene Bane(1,2,3-ct)Fyrene bense(1,2,3-ct)Fyrene bense(1,2,3-ct)Fyrene Bibens(1,3,1)Anthrocene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 7 Bibenzefuran<br>9 2,4-Dinitrotoli                   |
| 1-thier ophemyi-Phemyiether fluorme 1Bitro-dilling 1Bittro-dibmyishamal 1-Bitro-diphmyishamal 1-Bitro-diphmyishamal 1-Bitro-diphmyishamal 1-Bitro-diphmyishamine reachier ophemoi Pheme librace Bibutyi pathalate Floor allame Pyrene Butyi Benzyi pathalate Floor allame Pyrene bis[2-othyiberyi) pathalate Chrysene bictyj pathalate Chrysene bictyj pathalate Chrysene bictyj pathalate Chrysene bictyj pathalate Chrysene bictyj pathalate Chrysene bictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj pathalate Dictyj path                                                                                                                                                                                         | 7 2,6-Dinitrotole                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 11 d-Chlorophenyl-                                    |
| 4,5-binitro-2-esthylphenoi H-litrondiphosylanine 4-branghosyl-phinyletter Herschlerophonoi Phinotherophonoi Phinotherophonoi Physiotherophonoi Physiotherophonoi Physiotherophonoi Physiotherophinylete T,3-bitherophinylete T,3-eitherophinylete T,3-eitherophonoi Di-3-eitherophonoi  | 13 " (-N) (rajál) (bó                                 |
| d-bramphonyl-phinyletter insachlarabenzen reduchlarabenzen Princelen Bibutyl-phihalate Floranthene Pyrene Buyl-Benzyl-phihalate T,3Bichlerabenzidine Pyrene Bictyl-phihalate Chysene Bictyl-phibalate Chysene Bictyl-phibalate Chysene Bictyl-phibalate Chysene Bictyl-phibalate Chysene Bictyl-phibalate Chysene Bictyl-phibalate Chysene Bictyl-phibalate Disac(b)Fluerathene Bi-ac(b)Fluerathene Bi-ac(b)Fluerathene Bibenz(a,h)Anthracene Bibenz(a,h)Anthracene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14 4,6-Dinitro-2-                                     |
| Protection control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of | 16 4-Brosophenyl-                                     |
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| Florathee Florathee Florathee Pyree Dayl Decideding Formaliante Special Anthrocese his 2-ethylberyl) phthalate Chysene Bi-n-ctyl phthalate Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee Tenseth Florathee | 20 Anthraces                                          |
| Pyrene  Bulyi Benzyi phthaiste  3,3 -Bichlerobehzidine  Perzelajinativ cree  bis(2-ethylhenyi) phthaiste Chrysene  Bi-n-ctyl phthaiste  Penze(b)Fluerasthene  Penze(b)Fluerasthene  Penze(b)Fluerasthene  Penze(b)Fluerasthene  Penze(b)Fluerasthene  Benze(b,b,i)Perylene  Bibenz(a,b)Anthracene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                       |
| Persolalinteraces bis(2-ethylberyl) phthalate Chryses Bi-n-ectyl phthalate Penso(b)Fluorathese Penso(b)Fluorathese Penso(b)Fluorathese Indens(1,2,3-ed)Pyrese Indens(1,2,3-ed)Pyrese Dibens(a,b,i)Perylese Dibens(a,b)anthrocese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                       |
| bis(2-ethy)hesyl) phthalate Chrysene Bi-n-ecty  phthalate Bezzeth)Filueracthese Bezzeth)Filuerachhese bezzeta, h.j. jcd)Pyrene ladene(1,2,3-cd)Pyrene Bibezz(a,b,)dathrocene bibezz(a,b)dathrocene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                       |
| Di-m-ckyl phibalet Seaso(b)Fluorasthese Seaso(b)Fluorasthese Seaso(a)Syrene Indexe(1,2,3-cd)Pyrene Seaso(a,b,1)Perylene Sibenz(a,b)Anthracene                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                       |
| Denzel by lear as these Denzel by Plear as these Denzel a Pyrene Indene (1,2,3-cd) Pyrene Denzel g, h, 1) Per ylese Dibenz (a, h) An thracese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                       |
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1.	20 Trichloroethene										762 J	1141 J		3946	2000 J	
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		<b>"</b>	ā , š	2 =		×	35 <b>35</b>	0C-03-10 s 10'-20' 1-6-07
	1	127 <b>00</b> 127 <b>00</b> 23439	74430	22240		25020 1	55400 P	10:-15; 10:-15; 10:-15
		; ;	2	;			\$ <b>%</b>	1-7-97
		:					55 <b>9</b>	DC-H5-21 0-10' 1-7-87
	,		:	• <b>•</b>			32 B 2835 RE	BC-W6-22 35'-50' 1-8-07
						ដ	 3.8 4.8 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	BC-H7-23 35'-50' 1-0-07
							38 P 754 RF	90-18-24 5'-15' 1-9-87
						¥	6 F	90-89-28 15'-25' 1-13-87
		90470 E 15070		r 18:		3562	746 63 2192 63	9C-11-38 0-10* 1-27-67
		13500 3375 9160		5265		162261		90-12-39 51-25 1-20-67
		124900	. 1954 J			16 <b>9</b> 70 <b>9</b> 16 <b>9</b> 7	6920 B	90-13-40 57-157 1-28-47

Subsurface Sesis Volatiles

_{	7	<b>.</b>	SITE	SITE 1	site t	BINE 1	BL AMK	SITE I	- sine 1	-site i	SITE 1	SITE I	1 3112	SITE !	SITE I	SITE I	ा जाह	SITE J
•	,	<u></u> -	SAMPLE NUMBER SAMPLE DEPTH DATE SAMPLED	BC-15-41 5'-27.5' 1-30-07	9C-15-42 20'-30' 1-30-87	BC-16-43 10'-25' 2-2-87	9C-19-44 2-3-87	BC-17-45 3.5*-12.5* = 2-3-87	DC-17-46 13'-23' 2-3-07	9C-17-47 1 13"-23" 2-3-87	9C-19-48 6'-23' 2-4-87	BC-19-49 24'-30' 2-4-87	BC-110-50 15'-30' 2-4-87	BC-111-51 6'-70' 2-5-87	BC-111-52 26'-39' 2-5-87	0C-112-57 3.5'-12.5' 2-13-07	8C-112-58 18.51-27.51 2-13-67	9C-31-11 101-201 12-17-66
•			Chlorocethane Proceethane			•				<del></del>							· <del>*</del>	
	•		3 Vinyl Chloride															
	"		l Chiereethane 5 Methylene Chloride	5207 B	5310 B	1047 BJ		7 1	15 D	13 9	1117 13	418 93	1 636 BJ	B52 D.	1 46 9	17 8	17.1	5 83
			Acetone	10541 B			10 JB	-				5289 B		13861 D				
- 1			7 Carbon Disulfide			-						******			~~•		• • • • • • • • • • • • • • • • • • • •	
	•4		1,1-Bichiersethene															
	15		7 1,1-Dichloroethane															
•	'#. 		D trans-1,2-Bichloroethene I Chloroforn					3.1										
			2 1-2-Dichioroethane															
			3 2-Butanone (MEK)	13976 B	9794 1	9702 B	10	30 -		23	10731 B	4057 3	8640 B	14494 B	148 0	12 P	27 \$	22 9
•;	20		1,1,1-Trachlormethame					•				•	432 J			•••		
	24)		5 Carbon Tetrachloride															
			b Vinyl Acetate															
		-	7 Broodachlorocethane															
j	/ <u>-</u>		B 1,2-Bichloropropane F trans-1,3-Bichloropropene															_
			) Trichloroethese	3010									448 J					
•	-"		Dibrosechloresethane	••••									•••					•
!	- 10		2 1.1,2-Trichloroethane															
	. ب	-	3 Denzene	24130	437 3	2156					1000 1	107 1	1008 J	3340	23 J		•	
T	<b>9</b> 0		4 cis-1,3-Dichloropropene															
	31		5‴7-Chloroethyl Vinyl Ethör 6. Broonforn												•			
	12		b 970001078 7 4-Methyl-2-pentanone			4150											1 83	,
j	. 1		0 2-Heranone			1120											. ••	,
	أدر		9 Tetrachloroethene .	2667	2950								612 J					
_		3.	0 1,1,2,2-Tetrachloroethane															
- 1	·-j		1 Toluene	74130 B							77910	1353 9	3170	1037	49			
	"	-	? Chlorobenzene	45720	14166	7854		10			3234	935	2640	108220	2040			
i	•		3 Ethylbenzone 4 Styrene	9779	3048	5002					200 1	203 J	0140	1035 J	96			
			v Styrene S Total Hylenes	11049	1452 J	4150					847 J	102 J	2760	1420 J	86			
		•	= y . = n = p			****					•••		4.00					
- 1	.  -	·																

### Subsurface Soils Volatiles

$\mathcal{T}$		1	THE	SITE J	SITE J	SITE K	SITE	ZIJE K	N. Mark	BITE	SITE L	SITE C	SITE L	SITE L	SITE W	SITE W	N. M.	SITE P
	•	5	AMPLE MANGER	BC-J2-12	DC-13-13	DC-K1-00	DC-K2-25	DC-K3-32	IC-LD-01 +	BC-L1-02	DC-L2-03	BC-L3-64	BC-L4-09	DC-L4-10 B	BC-N1-05	BC-N2-06	BC-MB-07 +	DC-P1-53
141		5	AMPLE BEPTH	15'-25'	0-10.	0-10.	0-10.	10' -20'		5'-10'	5' -15'	5'-15'	1050.	10'-20'	0-10.	5'-15'		0-10.
		1	ATE SAMPLED	12-17-06	12-17-06	12-16-87	1-12-07	1-22-87	12-12-86	12-12-84	12-12-86	12-12-86	12-17-96	12-17-84	12-15-86	12-15-06	12-14-66	2-11-67
•	·	ı	Chierocethane	- ·- · ·- ·	· ·				· · · · · · · · · · · · · · · · · · ·					**				
		2	<b>Proceethane</b>															
		3	Vinyl Chloride															
		4	Chloroothane															
		5	Methylene Chiorade	372 NJ	2 DJ	6.0	13 P	7.8	17 B	14 B	141 6	2278 3	0	5 3	4 93	6 J	4 93	18 9
		6	Acetone	4487 B	467 BE	212 B	44 D	1003 EB	32 B	907 8	449 B	4557 B	32 0	01 b	45 B	11 63	23 9	1025 FE
٠.,		7	Carbon Disulfide					-										
•		•	i,l-Bichloroethene															
•		•	1,1-Dackloroethane															
٠.		10	trans-1,2-Dichloroethene															
•		11	Chlorotors									20253	96	49				13
• .,.		12	1-2-Bichlorgethane															
1		13	2-Butanene (MEK)	6026 B		25 B	29 9	29 8		16		10000 B	16 B			14 3		188 9
_			1,1,1-Truchloroethane	5,55		•••				•••						• • •		
•			Carbon Tetrachloride															
i'			Vinvl Acetate															
<b>-</b> 01			Brooodschloroeethane															
		-	1,2-Bichloropropane															
111			trans-1,3-Dichloropropens															
_ ```			Trichioreethene															
<b>5</b>			Dibrosochiorosethane															-
1000																		
[-:4]			1,1,2-Trichloroethane															
			Penzene								141	4177	7.3	4 3				49
344			cis-1,3-Bichloropropene															
			2-Chloroethyl Vinyl Ether													•	~	
• '•			Brosofora															
_ ,			4-Methy1-2-pentanene		4 3	11.7				• )	167		40 D	47 8	4 J			49
111			2-Hesanone															3.9
		29	Tetrachloroethene															
		30	1,1,2.2-Tetrachloroethane															
1		31	Toluene		• •	15					2179	26582	93	50				413
<b>_</b> '_		32	Chlorobeazene															138
┛		33	Ethylbenzene	2051							40 J							119
14411			Styrene															
			Total Tylenes	7949							179	670 J						450

Subsurface Soils Volatiles

-0	SITE	SITE P	SITE P	SITE P	SITE B	SITE 0	SITE O	SITE 0	SITE U	" SITE O	DLANK	SITE 8	SITE 0	SITE U	SITE U	SITE 0
	SAMPLE MUMBER	BC-P2-54	BC-P5-55	DC-P5-56 I	8C-01-59	BC-82-64	DC-03-61	9C-04-62	DC-05-63	BC-05-64 #	BC-00-45 +	DC-06-66	DC-09-72	DC-09-73	BC-010-74	BC-010-75
- 1-1	SAMPLE DEPTH	25'-35'	10'-25	10' -25'	15"-25"	5020.	1050.	0-10"	E.5'-20'	8.5'-20'		15'-25'	0-10.	£250.	\$"-[ŋ" "	1012.
	BATE SAMPLED	2-11-87	2-12-07	2-12-07	2-16-87	2-17-07	2-17-07	2-17-87	2-17-87	2-17-07	2-10-87	2-10-07	2-26-67	2-26-87 .	2-26-67	2-25 87
	1 Chlorosethane					*** ***	· <del></del>									
	2 Bronnarthene															
~ [+]	3 Vinyl Chloride															
_ j***}	4 Chloroethone															
	5 Methylene Chloride	5 N				35	10 J	632 PJ		10 J	139 B	4.1	610 MJ			
11.71	& Acetone 7 Carbon Disulfide	1034 BE	333 96	413 NE	[179 M	9103 <b>F</b> E	4405 PE	7492 \$	8654 <b>R</b> E	11443 PE		457 B		3791 F	194n H	2514 €
_ [15]	8 1,1-Bichleroethene															
	f 1,1-Dichloroethane					10 J								•		
	10 trans-1.2-Dichloroethene					197	6.3									
_ ''',	1) Chlorofora					172	• •									
	12 1-2-Bichloroethane					23										
•	13 7-Butanone (MEK)	76 8	27 1	26 B	30 B	25441 DE	34 8	7179 3	244 B	171 B		20 B		4444 B	7434 2	4 704 4
_ '' '	14 1.1.1-Trichloroethane	<b>/• •</b>	22 •	26.0	30 0	23011 00	36 8	1410	244 8	1/1 0		20 0		**** 5	/436 F	6705 8
	15 Carbon Tetrachiorade							1414								
7.	16 Vinyl Acetate															
	17 Broadichlorosethane															
	18 1,2-Bichlorograpane															
124	19 trans-1.3-Bichloroprobible							<b></b>						<u>-</u>		
	20 Trichlargethene					47										
●¦~¦	21 Dibroschlorosethane					• • • • • • • • • • • • • • • • • • • •										
12/	27 1.1.2-Trichlorgethane														-	
اتات	23 Benzene					667	24	30769		18 J					1795	
●¦⊹∤	24 cas-1,3-Bachloropropene					•••		30707		10 0					1713	
	75 2-Chlistethyl Vinyl Ether													-		_
	26 Proceform															
	27 4-Methyl-2-pentanone	29 8				1244 B		7692								
	28 2-Hexanone	2 93				63		,,,,								
_ "	29 Tetrachlorgethene	4 50				•*										
●, ;	30 1.1,2,2-Tetrachloroethane					28										
100	31 Toluene					4.		27487					293 J		4239	
_ 1	32 Chiorebenzene					1667	62	38462	74	159			273 J 841 J		58974	1250
• "	33 Ethylbenzene					46	167	166667 E	37 4	57 4			2439	74 J	9103	341 3
100	34 Styrene					70	. 107	19990/ E	37 4	3/ 3			2434	/4 3	7103	J41 1
140	35 Total Tylenes															
• *						141	976	615385 E	244	256			21951	235 J	29487	1114 J

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17 Brondsthlormethane
18 1,2-Bickloropropae
19 trans-1,3-Bickloropropale
20 frickloruethane
21 Bibrondchlormethane
22 1,1,2-Trickloroethane
23 Benzene 4-Methyl-2-pentamene 2-Meranone Tetrachloroethene 1,1,2,2-Tetrachloroethane Enternations

Franction

Viryl Chleride

Chlerathane

Hellylene Chleride

Corban Bissifide

1,1-Bichlerathane

1,1-Bichlerathane

1,1-Bichlerathane

1,1-Bichlerathane

1,1-Bichlerathane 24 cis-1,3-Bichloropropone 25 7-Chibroethyl Vinyl Ether 12 1-2-Bithlorethane 13 2-Butanee (MEX) 14 1,1,1-Trichlorethane 15 Carben Tetrachleride 16 Vinyl Acetate Chlerobenzene Ethylbenzene Styrene SAMPLE NUMBER SAMPLE BEPTH BATE SAMPLED .........................

# Subsurface Souls Semirolatiles

30 2-Mitreaniline	29 2-Chieronophthalene	28 2.4.5-Trichleraphenol	27 2,4,6-Trichlerophenol	26 Herachlorocyclopentadiene	75 7-Rethyliaphthalene	24 4-Chiere-3-eethylphenel	23 Merachlersbutadiene	27 4-Chleramiline	21 Naphtheiser	20 1,2,4-Trichlersbenzene	19 2,4-Bichlerophenol	17 Benzoic Acid	16 7,4-Disethylphenel	15 2-Hitrophenol	14 Isapharane	13 Mitrobenzone	12 Mesachloraethane	11 N-Mitreso-n-Dipropylacine	10 4-Methylphenol	9 bis(2-Chleroisopropyl) ether	8 2-Methylphenel	82000	6 Benzyl Alcohol	5 1,4-01010700000000	4 1.3-Dichleraberrane	3 2-Chierocheni		DATE SAMPLED [-12-07 ]-12-07	0-10	-	
					:													•				;					:	1-14-97		7 86-68-29 +	;
									f 5544		•										•	;		3554 -				1-14-87	5'-15'	BC-62-30	2116
!									424 1				,														!	1-14-87	5'-15'	DC-62-31 0	4116
		:						:					:			:												1-26-07	1020	SC-63-33	- 315
		•									i														•		ı	1-26-07	1	K-8-74	; ,
					-																		;	2376				1-26-87	5'-20'	_	3116 G
																								3750 J				1-26-87	5'-20	K-14-34	A 3110
			49,50		13970 J			5969 J	254000	J 1/8/	<b>3</b>										1554 J	•	£ 2809		9763	277	177900	1-27-07	S'-15'	IC-65-37 I	2116
					DW 1						19118																	2-23-07	20' - 30'	DC-64-67	2116
																											•	2-24-87		PC-60-40 ·	
		•						739769 3	109231 J	L 000021																	:	2-24-37	10'-75'		9116
!		Í ! !			f tates				5420571		restar																	2-24-67	1020.	DC-64-70	2116

115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 115-141 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115-141 115-141 115-141 115-141 115-141 115-14	511E W 12-10-07 1 12-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 11-10-07 1 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# Subsurface Soils Sensyolatiles

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					35 Dibenz(a,h)Anthracese	33 Indemo(1,2,3-cd)Pyrene		29 Di-n-octyl phthalate 36 Denzolb)fluoranthene	27 bis(2-ethylhexyl) phthalate 28 Chrysene		ļ	77 Fluoranthese	Di-o-butyl phthalate	7 Phendathrese	18 Pentachlurophenol	16 4-Bromphenyl-phenylether	19 4,6-Dinitro-Z-nethylphonol 15 M-Mitrocodiphenylanine		<pre>11 4-Chlorophonyl-Phonylether 12 Fluorene</pre>	10 Diethylphthalate	6 2,4-Dinitratelume	7 Dibenzefuran	5 2,4-Dinitrophenol	3 3-Mitrocolline	[ Bisethy] Phtholate 2 Acomaphtylone	SAMPLE DEPTH BATE SAMPLED	CAMPA C MINNER
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15   Hill treadelplacy lake   15969 J   16030 J   15160 J     16   Antach leve page   11759   17000 J   17000 J   17000 J     17   Antach leve page   11759 J   17000 J   17000 J   17000 J   17000 J     18   Antach leve page   11759 J   17000 J   17000 J   1700 J     18   Antach leve page   17590 J   17500 J   17000 J     18   Antach leve page   17500 J   17500 J   17500 J     18   Antach leve page   17500 J   17500 J     18   Antach leve page   17500 J   17500 J     18   Antach leve page   17500 J   17500 J     18   Antach leve page   17500 J   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18   Antach leve page   17500 J     18		•														
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28 Interaction         Author scene         203200         23464 J         9728         15400 B         10044         10332           21 In-relaty phthalate         203700         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1880 J         20370         1890 J         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         20370         <		-	:					1								•
21 Bit betalate         29390         34940 J         9728         15400         8900         16435         16332           22 Finerables         20300         16800 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         2005 J         200		_			\$25£		23100 J					6 6457				DC!
22 Fluoranthene         20200         18480 J         2005 J           23 Bryte Boryl phthalate         24000 J         49200 J         2205 J           24 Bryte Boryl phthalate         13900 J         13000 J         2335         48450 J           25 Brid-Telby Boryl phthalate         31050 J         130900         2335         48450 J         48450 J           27 Branck phthalate         35 Boratelby Fluoranthene         32430 J         33430 J         48450 J           38 Boratelby Fluoranthene         33 Boratelby Free         33430 J         48450 J         48450 J           38 Boratelby Fluoranthene         33 Boratelby Free         33430 J         48450 J         48450 J           38 Boratelby Fluoranthene         33 Boratelby Free         33430 J         48450 J         48450 J		•			203200		369%	9728	15400	<b>8</b>	97901		10332			11280
23 Pyrone     24000 J     49200 J     2205 J       24 Butyl Benzyl phthalate     159000 J     159000 J     275 J,**-Dicklorebenzidise       24 Benzyl phthalate     27 Bis(2-ethylbenzyl) phthalate     31050 J     150900     2375       27 Bis(2-ethylbenzyl) phthalate     31050 J     150900     2375     150900       29 Benzyl phthalate     30 Benzyl phthalate     3588     5720 J       31 Benzyl phthalate     32430 J     5588     5720 J       32 Benzyl phthalate     32430 J     5588     5720 J       34 Benzyl phthalate     32430 J     5588     5720 J       35 Bibenzyl phthalate     3588     5720 J     68430 J       34 Benzyl phthalate     3588     5720 J       35 Bibenzyl phthalate     3588     5720 J		_			203200		£ 08181									
24 Butyl Benzyl phthalate     139000 J       25 3,3"-Dicklocebenzidine     25 S.3"-Dicklocebenzidine       24 Benzolajfeth acree     27 Bus(2-ckyl phthalate       27 Bus(2-ckyl phthalate     31050 J       28 Benzolajfete     32430 J       39 Benzolajferene     32 Benzolajferene       31 Benzolajferene     32 Benzolajferene       32 Benzolajferene     33 Benzolajferene       33 Benzolajferene     34 Benzolajferene       34 Benzolajferene     35 Bibenzolajferene		_			24m0 J		1926					2205 3				
73 3,7"-Dicklorobeazidiae 24 Dezelajdatha erne 27 District of the late		_			139000											
24 DerzelajMatha erene     275 Jack 1       27 Basi (2-ekylbery) phhalate     31050 J       28 Chrysene     538       29 BaszelajPrene     32430 J       31 DerzelajPrene     32 BaszelajPrene       32 BaszelajPrene     33 Indenetia, 2, 3-cd/Prene       33 Indenetia, 2, 3-cd/Prene     34 BerzelajPrene       34 Berzelaj Matha erene     35 Dabent (a, b) ferylene       35 Dabent (a, b) ferylene     35 Dabent (a, b) ferylene	į	~		:					,					•		:
27 bis(2-tty) bitbaiste 51030 J 130900 2375 48430 J 28 Chrysene 529 539 535 5430 J 29 Chrysene 530 bis(2-tty) pitbaiste 539 539 539 539 539 539 539 539 539 539		_					,							6720		
29 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 30 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 30 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 30 Baraclaff wor author 30 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 30 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Baraclaff wor author 37 Baraclaff wor author 38 Baraclaff wor author 38 Baraclaff wor author 39 Baraclaff wor author 30 Baraclaff wor author 30 Baraclaff wor author 31 Baraclaff wor author 32 Baraclaff wor author 33 Baraclaff wor author 34 Baraclaff wor author 35 Baraclaff wor author 36 Bar		- `					1 20400			2375	1		5535		48430	
77 Benzelejivoranthare 30 Benzelejivoranthare 32 Benzelejivoranthare 33 Indemo(1,2,3-cd)Pyrene 34 Benzeleji,jPerylene 35 Bibenziq,hjdethacene																ı
31 Benzekafteraktene 32 Benzekaftyrene 33 Indene(1,2,3-cd)Pyrene 34 Benzekak,afterylene 35 Babenzka,hjdatteracene							12430 1									
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	SITE	SITE I	SITE I	SIJE 1	SITE J	ELLE 1	SITE E	_ RILE K	SITE K	DLANK	SITE L	SITE L	SITE L	SITE L	SITE L
	SAMPLE MUMBER	DC-112-57	DC-112-58	BC-J1-11	BC-J2-12	DC-12-12	8C-K1-00	BC-K2-25	BC-K3-32	DC-LD-01 +	DC-L1-02	BC-L2-03	DC-L3-04	BC-L4-09	BC-L4-10
	SAMPLE DEPTH	3.5'-12.5'	10.5"-27.5"	10' -20'	15"-25"	0-10'	0-10.	0-10.	1050.		5'-10'	5'-15'	5'-15'	1050	10'-20'
	DATE SAMPLED	2-13-87	2-13-87	12-17-86	12-17-06	12-17-06	12-14-07	1-12-87	1-22-87	12-12-86	12-12-86	12-12-86	12-12-86	12-17-06	12-17-86
	Tinethyl Phthalate														
	2 Acenaphtylene							220 J							
	3 3-Mitroaniline 4 Acenaphthene				2179 J		150 J					44 J			
	5 2,4-Dinstrophenel				2174 3		130 3					44.7			
	6 4-Mitrophengi														
	7 Diseasofuras				1013 J	•	129 J	104 J							
	8 2,4-Binitrotoluene				*****										
	7 2,6-Dinstrotoluene														
	10 Biethylphthalate														310
	11 4-Chiorophenyl-Phenylether														
	12 Fluorene				3462 J			195 J							
	13 4-Mitroaniline														
	14 4,6-Binstro-2-sethylphenol														
	15 M-Mitrosodiphonylanine														
• •	16 4-Branopheny)-pheny)ether														
	17 Hexachlorobenzene														
	18 Pentachlorophonol											11538	58228		
	17 Phenanthrene				14103		1929 J	1700	339	45 J		692	1777 1		
	20 Anthracene				910 J		294 J	415							
	21 Di-n-butyl phthalate		134 J					376 N			171 J		2784		
	27 Fluoranthene				462 J		1765 J 1765 J	2176	1208 434			448 202 J			
	23 Pyrene 24 Butyl Benzyl phthalate				462 3		1/65 3	1342	934			767 J			,
	"75" 3,3"-Bichlerebenzidine													<u>.</u>	
	26 Benzolal Anthracene						941 J	878	332 J				911 3		
	27 bis(2-ethythexyl) phthalate	•		1027	2949 J	1100	21176 E	1074	4601 D			1217	*** *	750	1297
	28 Chrysene			1417			1035 J	891	544			205 J		, ,,	****
	29 Bi-m-octyl phthalate						2941	146 J	302 J			••••			
	30 Benzoible lugranthene						1035	1220	619						
	31 Benze(t)Fluoranthene														
	32 Benzo(a)Pyrene						929 J	939	378 J						
	33 Indono(1,2,3-cd)Pyrene						-	<b>610</b>						•	
	34 Benzo(g,h,i)Perylene							598							
	35 Dibonz(a,h)Anthracene														

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Subsurface Soils Secivolatiles

. (1	SITE	SITE #	SITE W	ST WAX	SITE P	SITE P	BITE P	SITE P	SITE 0	SITE B	SITE 0	SITE 0	SITE 0	SITE 0	pį AMK
3	SAMPLE NUMBER	BC-W1-05	BC-H2-06	3C-100-67 +	DC-P1-53	DC-P2-54	DC-P5-55	BC-P5-54 1	DC-01-59	DC-02-60	DC-03-\$1	DC-04-62	DC-05-63	DC-05-64 1	BC-08-65 +
اة	SAMPLE BEPTH	0-10"	5'-15'' -		0-10"	25'-35'	101-25	10'-25'	15' -25'	2030.	10'-20'	0-10.	8.5'-20'	8.5'-20'	
•	BATE SAMPLED	17-15-86	12-15-86	12-16-84	2-11-07	2-11-07	2-12-07	7-12-07	2-16-87	2-17-07	2-17-87	2-17-07	2-17-07	2-17-67	2-10-0?
- },'	3 Bisethyl Phthalate			•	=										
	2 Acenaphtylene														
•	3 3-Mitroansline 4 Acquaphthene														
	5 2,4-Binitrophenol														
	4 4-Mitrophenol														
	7 Bibenzofuran		-												
10	6 2,4-Dinstrotaluene														
٠٠,	9 2,6-Binitrotoluene														
- [16]	10 Biethylphthalate 11 4-Chlorophenyl-Phonylether														
	12 Fluorene														
	13 4-Mitrosmiline														
20	14 4,6-Danitro-2-methylphenol	,													
	15 M-Mitrosodiphonylamine											50000 J			
1.4	li 4-Brosophenyl-phenylether														
0 21	17 Hexachlorobenzene														
144	19 Pentachlorophenol										22619	474359 J			
23	19 Phenanthrene 20 Anthracene	424		-				. •				217999	Je2 1		
	20 anturacine 21 Bi-n-butyl phthalate				14250 J	155 J	43 1	325 J	5267		5357		3700 J		27 <b>8</b> 5 J
27	77 Fluoranthene	484	253 J		10230 4	123 4		323 4	3201			435 <b>70</b> J	3/80 3		2/85 3
	23 Pyrene	553	215 J									282051			
	24 Butyl Benzyl phthalate														
	75 3,3'-Bichlorobenzidine												-		
<b>B</b> 12	26 Benzo(a)Anthrocone	263 J										121795			
	27 bis(2-ethylhexyl) phthalate	934	1266					225 J	1379 \$	j	1905 PJ			2439 JB	
~_ "i	28 Chrysene 29 Bi-n-octyl phthalate	276 J										202031		1951 J	
	30 Denzo(b)Fluoranthene	209 J	152 J									79487 J			
i wa	31 Benze(h)Fluoranthene	, .	172 •									**************************************			
•	32 Penze(a)Pyrene	211 J			•							66667 J			
• j.,	33 Indeno(1,2,3-cd)Pyrone														
1	34 Benzolg,h,i)Perylene											52544 J			
	35 Dibenz(a,h)Anthracene					•									
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## Subsurface Soils Sevivolatiles

_	1	- SITE	SITE 0	SITE 0	SITE 0	SITE 0	SITE 0	
	3	SAMPLE MUMBER SAMPLE BEPTH BATE SAMPLED	PC-86-66 15'-25' 2-18-87	9C-09-72 0-10' 2-26-07	BC-09-73 15'-20' 2-26-87	DC-010-74 5'-10' 2-24-07	0C-010-75 10'-15' 2-26-07	-
- {	; -	1 Disethyl Phthalate						=
	•	2 Acenaphtylene						
	•]	3 3-Mitroaniline		****				
	***	4 Aconaphthono		2561 J				
	'']	5 2,4-Binitrophenet 6 4-Nitrophenel						
ď	19.	7" Dibenzoturan		1963 3				
	17.	8 2,4-Binitrotoluene						
	12.	9 2,4-Binstrotoluene			•	•		
-		" " 10 Diethylphthalate						
او	, .{	11 4-Chiorophenyl-Phenylether						
۱	1 80	12 Fluorene		3049 J				
i	12	13 4-Witreamiline		-				
	ان.	14 4,6-Binitro-2-nethylphenel						
_	21	15 M-Mitrosodiphonylacine		10244 J				
		16 4-Drooophenyl-phenylether 17 Mexachlorobenzene						
0	1	17 Hexachlorobenzene 18 Pentachlorophenol		329748	6420 J	112021 J	7159 J	
ı	24	19 Phonanthrone		21931	469 3		863 1	
		20 Anthracene		4146 J		72,300	•	
U		21 Di-n-butyl phthalate		7195 J			5000 J	
		22 Fluoranthene		7317 J		11076 J		
	٠.	23 Pyrane		62195	1405 J	02051	1477 J	1
	30	24 Butyl Benzyl phthalatu				3844154 E	67645	
	,,;	25 3,3'-Bichlorobenzidine			-			
	'a:¦	26 Benzo(a)Anthracone		25610				
	• •	27 bis(2-ethylhesyl) phthalate			914 J		1000 1	
		28 Chrysene		42195	1405 3	02051	1819 J	1
•	<u>'</u> '	29 Bi-n-octyl phthalate		17073 1				
	j ••• l	30 Denzo(b)Fluoranthene	_	1/0/2 1	l			
	"	31 Benzo(t)Fluoranthene 32 Benzo(a)Pyrene		17512				
J		33 Indeno(1,2,3-cd)Pyrene		11711				
	ויייו ייייו	34 Benzo(q,h,i)Perviene		17073 J	I		•	
	'ad	35 Dibenz(a,h)Anthracene		••••				
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Subsurface Soals Pest/PCDs

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•	SAMPLE MUMBER SAMPLE BEPTM BATE SAMPLED	9C-61-26 9-10' 1-12-87	BC-61-27 10'-20' 1-12-07	BC-60-29 +		DC-67-31 1 5'-15' 1-14-07	BC-63-33 10'-20' 1-24-87		BC-64-35 5'-20' 1-26-87	DC-64-36 5'-20 1-26-87	BC-65-37 # 5'-15' 1-27-87	8C-64-67 20'-30' 2-23-87	DC-68-68 +	DC-67-69 10:-25: 2-24-87	8C-68-70 10'-20' 2-24-87	DC-69-71 351-401 2-24-67
, , , ,	1 Alpha-MC 2 Beta-MC 3 Belta-MC 4 Gamma-MC (Lindane)															
14	5 Meptachlor 6 Aldrin 7 Meptachlor Epoxide 8 Edosulfan I 7 Dieldrin															
• 1/ 1/ 1/ 2/ 2/	10 4,4 -00E 11 Endrin 12 Edosulfon II 13 4,4 -000 14 Endosulfon Sulfate			-	3073	3483 -	-					52941		1353 <b>85</b> J		
22 23 44 5 27	15 4.4'-MT			· •												
1,000	/1 MWJ. 487*1778															
- 1 2 2 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	24 MRDCL 9R-1249 25 AROCL 9R-1254 26 AROCL 9R-1260	130 J						1792 J			57150	764706	. •	66153 <b>8</b> J	4420571	267442 (
30) 31) 32 33) 14																

10 - 45 - 16 - 16 - 45 - 16 - 45 - 17 - 17 - 47 - 17 - 17 - 47 - 17 - 17		3115	\$17E M	81TE #	S116 H	811E H	SITE N	# 311 <b>5</b>	PL AME	8 J.L.S	SITE H	811E #	N 3115	S11E #	1 3118	S11E I	SITE
A   A   A   A   A   A	<b>:</b>	SAMPLE MEMBER SAMPLE REPTH PATE SAMPLED	DC-81-14 15'-25' 12-10-06	DC-H1-15 35'-56' 12-10-07	9C-H2-16 5'-20' 1-5-07	DC-H3-17 10"-20" 1-6-87	DC-N3-18 0 101-201 1-6-87	10'-25'	_	BC-HS-21 9-10* 1-7-67	9C-146-22 35'-50' 1-8-07	DC-N7-23 35'-50' 1-0-07	NC-HB-24 5'-15' 1-9-67	BC-HY-20 15'-25' 1-13-07	DC-11-38 9-10 1-27-07	BC-12-39 5 - 25 1-26-07	90-13-40 5-15-
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## Subsurface Soils Pest/PCDs

		\$11	E	811E I	SITE I	SITE I	BLANK	SITE I	SITE 1	SITE I	SITE I	SIFE I	SIIE I	SITE I	SITE I	SITE I	SITE 1	SITE J
•	•	SAI SAI	IPLE HUMBER IPLE DEPTH IE SAMPLED	BC-15-41 5'-27.5' 1-30-07	BC-15-42 201-301 1-30-87	9C-14-43 19'-25' 2-2-97	0C-10-44 2-3-07	BC-17-45 3.5'-12.5' 2-3-87	DC-17-46 13'-23' 2-3-07	DC-17-47 # 13'-23' 2-3-07	BC-19-48 61-231 2-4-87	BC-19-49 241-301 2-4-87	DC-110-50 15'-30' 2-4-07	DC-111-51 6'-20' 2-5-87	9C-111-52 261-391 2-5-07	DC-112-57 3.51-12.5 2-13-07	BC-117-50 18.5 -27.5 2-13-07	DC-J1-11 10 -201 12-17-06
•	, ,	2 1	Alpha-BHC leta-BHC lelta-BHC						<u> </u>									
		- 5 I	Gamma-BHC (Lindane) Heptachlor Aldrin	-	•													
	13	8 (	leptachlor Epoxide Edosulfan I Dieldrin 1,4'-00E															
	16	11 6	indrin Edosulfan II 1,4'- <b>300</b>								29694	4442		-				
	::1	14 6 15 4 16 7	indosulfan Sulfate 1,4°-00T lethoxychlor									4305				•		
	25	10 ( 19 1	indrin Ketone Talordane Iozaphene		<b>-</b>	472000									<del>.</del>			
•	27 28	21 /	MOCLOR-1016 MBCLOR-1221 MBCLOR-1232 MBCLOR-1242															
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## Subsurface Soals Post/PCDs

	1				**													
		SITE	SITE J	SITE J	SITE K	SITE K	SITE K	BLAK	SITE L	SITE L	SITE L	SITE L	SETE L	SITE N	SITE W	BLANK	SITE P	
1.	·	SAMPLE NAMBER	DC-J2-12	BC-33-13	DC-K1-08	DC-1.2-25	DC-K3-32	IC-LB-01 +	DC-L1-02	€C-L2-03	DC-L3-04	DC-L4-09	BC-L4-10 \$	BC -N1 -05	BC-42-46	SC -109-07 +	BC-P1-53	
	f	SAMPLE BEPTH	15'-25'	0-10.	0-10	0-19.	10'-20'		2, -10,	2,-12,	5' -15'	1050.	10'-20'	0-10	5'-15'		0-10	
•	l	BATE SAMPLED	12-17-06	17-17-86	12-16-87	1-12-07	1-22-07	12-12-06	12-12-86	12-12-84	12-12-06	12-17-86	12-17-84	12-15-84	12-15-06	12-16-06	2-11-07	
- }-			12-17-00		12-10-07	1-12-W/	1-22-07		12-12-00	12-12-00	12-12-00	12-17-00	12-17-00	12-13-08	12-13-00	12-10-00	4 11 0	
		1 Alpha-DIC																
•	ļ	2 Deta-DHC																
		3 Delta-BHC																
		4 Gaona-BHC (Lindane)																
	)	5 Heptachlar																
1		& Aldrin																
	1	7 Neptachlor Epoxide					•											
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	ł	11 Endrin																
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2.5		TO Chlordone																
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1,	i	20 ARBCL BR-1016																
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1	1	74 MOCLOR-1246			117647 0	1990	-											
<b>(</b> )	<u> </u>	25 AMBCLOR-1254																
	1	26 AROCLOR-1260		179		6344												

## Subsurface Soals Pest/PCBs

	SITE	SITE P	SITE P	SITE P	8118 0	9115	SITE O	SITE O	SITE O	SITE O	PLANK	SITE O	SITE O	SITE D	SITE O	SIIE O
5	SAMPLE MUMBER SAMPLE BEPTH BATE SAMPLED	BC-P2-54 251-351 2-11-07	BC-P5-55 101-25 2-12-07	8C-P5-56 1 101-251 2-12-87	BC-81-59 15'-25' 2-16-87	BC-02-60 201-301 2-17-87	BC-03-61 101-201 2-17-87	DC-B4-62 0-10' 2-17-07	BC-05-63 B.51-201 2-17-87	BC-05-64 # 8.51-201 2-17-87	DC-08-65 + 2-10-07	DC-04-66 151-25 2-18-87	BC-09-72 0-10' 2-26-87	DC-09-73 151-20 2-26-87	DC-019-74 5'-10' 2-26-87	DC-01G-75 10 -15 2-26-67
	1 Alpha-BHC 2 Beta-BHC															
 	3 Belta-BHC 4 Gamma-BHC (Lindame)															
112	5 Heptachlor															
1 4 1 4 1 5 1 0	& Aldrin 7 Heptachler Epoxide				•											
1.0	8 Edosulfan l 9 Dieldrin															
	10 4,4'- <b>90E</b> 11 Endrin															
	12 Edosulfan II 13 4,4'-900					, <del>.</del>									•	
) 20 41	14 Endosulfan Sulfate															
2 : 2 :	15 4,4'- <b>00</b> T 16 Nethoxychlor															
2-	17 Endran Ketone 18 Chlordane					4.5	·									
	19 Toxaphene 20 AROCLON-1016															
20	21 AROCLOR-1221 22 AROCLOR-1232						-		26 <b>829</b> C	30366						
20   80	23 ANGCLOR-1242							1871795	20027 (	20799			634146	24691	461539	11364
 	"															
14.3	26 AROCLOR-1260								54 <b>80</b> J	C 3902 J						

_1	•		SITE	SITE 6	SITE 6	R ANK	SITE B	SITE 6	SITE 6	BLANK	SITE 6	SITE 6	SITE 6	SITE S	PLANK	SITE 6	SITE 6	SITE 6	
•	,		SAMPLE MUMBER	DC-61-26	BC-61-27	SC-68-29 +	BC-62-30	9C-62-31 1	BC-82-33	1C-68-34	BC-64-35	BC-64-36	BC-65-37 I	DC-G6-67	9C-68-48 +	DC-67-69	DC-68-70	BC-69-71	
- [	•		SAMPLE DEPTH	0-10"	10'-25'	-	212.	5'-15'	3050.		5' -20'	5" -20	5"-15"	5020.		10"-25"	1050.	351-401	
	•		DATE SAMPLED	1-12-87	1-12-07	1-14-87	1-14-07	1-14-07	1-26-07	1-24-07	1-26-87	1-26-97	1-27-07	2-23-07	2-24-07	2-24-97	2-24-87	2-24-87	
ŀ	,  -		Alusiaus	9748	10637	12021	5304	3386	T2767	14357	8671	8200	9304	1859	6785	16613	4343	766	
	•	2	Anticony			****	••••												
	•	3	Arsonic	4 8	2 8	6 R	3 M	2 R	5	7	4	4	5		6 R	123 R	16 R		
- 1	-		Barius	213	140	359	45747	15570	204	424	117	140	233	142	363	1554	284	173	
		5	Beryilium																
		4	Boron																
1	13	7	Cadaine	<del>-</del> · ·		7	7	-		3.					2	14	5		
			Chronium, trivalent	•	6	13	10	5	16	13	9	η.	16	12	11	985	107	11	
		•	Cobalt				54	19					16					13	
i	144,	10	Copper	16		31	29	•		22	18	3	14	18	30	2215	507	10	
	إن	11	Iron	14000	9853	14292	13544	4392	12712	13046	8027	9900	11418	6035	12354	53692	12243	4056	
•	•	12	Lead	12 R	0.8	68 R	30 A	16 R	11 4	51 #	8-1	32 8	14 4	25 8	57 8	3123 1	833 1	22 6	
- 1	1 50	13	Ranganese	300	179	410	242	92	278 R	382 R	182 R	209 R	461	73 \$	357 1	282 8	193 8	43 1	
•	<b>.</b>		Nercury	♦.3													34.3		
		15	Nichel	13		17	35		15	19	13	13	87	10 1	14	123 #	399 6		
1		14	Selenium																
	. ,	17	Salver														12		
		16	Thellium																
į,	25	17	Tia			<del>-</del>	•••										26	<del></del> .	
		20	Vanadius	20	21	34	22	14	25	20		19	27	31	16	1315	109		
	47	21	linc	103	27	167	115	39	44	196	50	45	224	84 6	168 4	2954 4	4257 8	51	
	20		Cyanide		•	-		_								3.2.			

## Subsurface Soil Inorganics

_ [	rT i		SITE	S:15 H	SITE W	SITEM	SITE A	SITE H	SITE W	E WK	SITE H	SITE H	SITE H	SITE #	BITE N	SITE I	SITE I	SITE I
•	3	- · ·	SAMPLE NUMBER SAMPLE DEPTH	DC-R1-14 151-251	DC-N1-15 35'-50'	DC-H2-16 5'-20'	ВС-ИЗ-17 10'-20'	DC-H3-10 0	DC-H4-19 10'-25'	BC-HB-20 +	DC-H5-21 0-10'	BC-H6-22 35'-50'	BC-H7-23 351-501	BC-H0-24 5'-15'	DC-H9-20 15'-25'	DC-11-38 0-16	9C-12-39 51-251	DC-13-40 5'-15'
	5		DATE SAMPLED	12-18-86	12-10-07	1-5-07	1-6-07	1-6-87	1-4-87	1-7-87	1-7-87	1-0-07	1-0-07	1-9-97	1-13-87	1-27-07	1-29-07	1-29-87
- 1	<b>,</b>		1 Aluminum	2403	1452	7615	450	497	7167	10974	7074	7811	2282	12117	2203	13348	1257	12324
•	•		2 Antinony															
	•		3 Arsenic	26 \$	3.1	7 R	15 R	13 R	380 N	A R	42 R			4 R	3 A	11		6
	10		4 Barium	3242	30	1879	05	97	607	372	331	55	46	218	52	3403	919	334
•	11		5 Beryllium															
Ī	'네_		6 Boron															
- 1			7 Cadmius	232					-244		221					11		3
•	1.4		Chronium, trivalem		•	• • • • • • • • • • • • • • • • • • • •			31	15	26	•	5	10		115	15	16
i	1		9 Cobalt	19	2	105			4/	•							27	14
ĺ			16 Copper	374	3	415	13	12	2444	29	972	****		51		<b>630</b>	84	518
•	• !		ll Iron	40226	3810	84545	510	564	54167	15641	27160	5905	4741	20519	5215	41507	10135	19732 4
	141		12 Lead	1150 1	4.1	174 R	5 A	4 8	4500 R	44 R	3827 R	4 R	3 R	84) B	5 R	171 #	81 1	373
i	٠.,		3 Hanganese	2403	51	621	7	7	2797	374	34543	78	71	239	44	256 R	76 R	404 R
			4 Hercury	0.0				_	3.9			_	_	1.4		2.2	ð. <b>5</b>	
	21		15 Hickel	15097	70	298	•	4	2003	17	42	•	7	16		111	701	29
1	24		lé Selenium	7														
	اد د		17 Silver	4 R					•		44							
	24		IO Thelitum								1							
ı	- 5		19 Tin	- 111 -		. 14		–								-33		
			20 Vanadius	95			_		20	27	20	•	7	27		553	20	_ 32
	4		21 linc	39514	39	248	•	10	3875	153	8099	23	15	308	20	6329	491	331
- 1	20		77 Cyanide	7	·													

)	•	MDSWFTACE BOIL INDFŞANII	<b>(5</b>														
ćΙ		SITE	SITE 1	SITE 1	SITE T	SLAK	SITE I	SITE T	SITE I	SITE I	SITE 1	SITE 1	SITE I	SITE I	SITE I	SITE I	SITE J
2 3 0 0 7 0 0		SAMPLE NUMBER SAMPLE BEPTH DATE SAMPLED	BC-15-41 5'-27.5' 1-30-87	DC-15-42 20'-38' 1-30-07	8C-16-43 16'-25' 2-2-87	DC-10-44 2-3-07	9C-17-45 3.5'-12.5' 2-3-97	0C-17-46 13'-73" 2-3-07	BC-17-47 6 13'-23' 2-3-07	BC-19-48 6'-23' 2-4-87	9C-19-49 24'-30' 2-4-87	BC-110-50 151-301 2-4-87	0C-111-51 6'-26' 2-5-07	BC-111-52 26'-39' 2-5-07	8C-112-57 3.5'-12.5' 2-13-87	8C-112-58 18.5'-27.5' 2-13-07	0C-J1-11 10'-70' 12-17-96
													4430			1205	6904
		1 Aluninua 2 Antioony	2063	1040	1752	15 15	7175	7863	2747	3097	1556	1607	8630	1011	1449	1543	8704
		3 Armenic	3	••	14	7	3	3	2	14		1			2 8	Ì	3 1
100		4 Barius	3544		400	347	338	62.	<b>0</b> 2	519							156
1.2		5 Beryllium 6 Boron											1530				
l'		7 Cadeine	· 2 ··		7	7	. 2-			13							
13		8 Chronius, trivalent			731	12	23	5	5	96 (	4	4	7	•	4	4	9
1.5		9 Cobalt	22		22					34		13	140				•
10		10 Copper 11 Iron	157 11418	3553	149 23231	28 14744	<b>258</b> 14935	7300	7468	57 <b>5</b> 27647	4667	4687	23 543	2047	4897	4297	Levên
i'.l		12 Lead	232 1			14/44	14132	10 1	10 8	5647 1	704	11		29 1			-
		13 Hanganese	115 R			395 R	240 R		125 R	240 R	33 A	61 8	5483 \$		199.0	63 1	250
20		14 Hercury	1.1		1.5					3.2			240 R				
j2+		15 Nickel 16 Selenius	2405	31	51	15	35		11	204		145	0.9 1320	11	•		11
Ľi		17 Silver											1320				
23		18 Thallium															
1 4		19 Tin			14	4	11			24	5	2					
26		70 Vanadium 21 Zinc	26 201	13	69 452	21 2 <b>6</b> 3	10 439	29	27	40 1156	125	87	43		21 1	20 6	15 36
25 26 27 28		21 EINC 22 Cvanide	. 3	13	992	703	434		21	1130	129	<b>B</b> Y	31 <b>8</b> 3	10	24 (		. 38
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Sabsurface Soil Inorganics

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	+ £0-64-36	DC-N3-09	DC-N1-02	1 01-17-30	60-11-30	DC-F2-04	DC-F3-02	DC-FT-05	+ 10-07-30	DC-K2-25	BC-K5-52	DC-K1-00	DC-12-12	DC-13-13	¥30MM 314MV	
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	sme —	"SITE P	BITE'P	SITE	SIJE 8	SITE O	SITE	SITE U	BIJE 0	SITE 0	PLANK	SITE 0	SITE 8	SITE 0	SITE 0	SITE O
	SAMPLE MAMBER SAMPLE BEPTH	BC-P2-54 25'-35'	BC-P5-55 10*-25	9C-P5-56 1 101-251	8C-01-59 15'-25'	9C-02-60 20'-30'	9C-03-61	8C-84-62 8-10	9C-05-43 0.51-201	BC-05-64 8 B.5'-20'	BC-00-45 +	9C-06-66 15'-25'	9C-89-72 0-10	BC-89-73 15*-20*	8C-010-74 51-10	0C-016-75 101-151
	BATE SAMPLED	2-11-97	2-12-87	2-12-07	2-16-87	2-17-07	2-17-67	2-17-07	2-17-07	2-17-87	2-10-07	2-19-87	2-26-07	2-26-87	2-26-87	2-26-87
	1 Aluainus 7 Antipany	1274	- 134	2228	2022	1923	3786	5005	3525	3061	6215	2145	4762	3344	2028	2110
	3 Arsonic	**	3 A	4 R	4.9	•	4 0		3 0	3 R		2 8	. A	3 0	/ 4 158	•
	4 Boriuo 5 Berylliuo		•1	117	57		131	214	106	101	411		145	125	150	•
	é Boron 7 Cadaiya							31 ~			2		4		11	
	B Chronium, trivalent 7 Cobalt	3	14	10	- \$	4	•	10	7	•	10	\$	13	6	22	
	v cosit O Copper		16	- 24				203	,		33		39		301	1
	i Iran 2 Lead	4131	153 <b>07</b> 526 0	13000 10 1	5230 3 a	57 <b>0</b> 5	7548 7 I	11059 147 1	9102 7 1	8232 9-1	12650 54 8	4015 4 4	11793 18 #	75 <b>0</b> 0 5 4	11910 71 1	564
1	3 Ranganese	42 1	673 E	710 1	166 1	108 1		329 1		107 1	337 4	79 1	190 1	152 #	206 1	
	4 Hercury 5 Hickel	0.6	15 1	23 •				4.3 45 1	11 •	10 1	15 0		1.7 <b>38</b>	0.3	1.7 136 0	
	6 Selenius 7 Silver	•														
1	8 Thallium															
	9 Tin 10 Vanadius		22	16	· · · ·		13	18			15		19		15	
	ll linc 12 Evanide	17 1 13	47 1 15	74 4	10 1	18 1		1370	37 1	35 1	181 1	17 1	277	30 1	488 1	(
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## APPENDIX E

## SUMMARY TABLES FOR SITE-SPECIFIC CONTAMINANT LOADING TO THE MISSISSIPPI RIVER

Table E-1

CONTABILIANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE Q

		Worksontal	1000	h.19051	Volatiles	Pajpess	Carcinoponic Phas.	Feeding	Non-Carcinegenic Phas**		Total PRAST. Total PCBs	Tetal PCBe	Landing
	Ar ••	Flow Rate Q	Ave. Conc.	to Biver	Ave. Comc.	to Biver	Ave. Conc.	C. Hiver	Ave. Cenc.	to Miver	Londing to Ave. Conc.	Ave. ceac.	
	(R. <sup>2</sup> )	(213/day) (ug/L)	(1/2)	(1b/day)	(1/40)	(1b/day)	(m//L)	(1b/day)	(ug/L)	(18/day)	(lb/day) River (lb/day) (ug/L)	(1/50)	(1b/day)
January	2,420.90	-13.00	35,129.6	-J.03 # 10 <sup>-3</sup>	2,986.5	-2.50 H 10 <sup>-3</sup>	4.79	-4.10 x 10-6	8	:	-4.10 # 10-6	=	-7.16 a 10 <sup>-5</sup>
Pobruary	3,370.00	-14.04	35,139.6	-3.00 x 10 <sup>-2</sup>	2,986.5	-2.62 x 10 <sup>-3</sup>	4. 75	-4.17 m 10 <sup>-6</sup>	3	;	-4.17 # 10 <sup>-6</sup>	:	-7.20 a 10 <sup>-3</sup>
March	2,473.61	<b></b>	15,129.6	-2.17 m 10 <sup>-2</sup>	2,906.5	-1.45 * 10-3	4.75	-2.94 = 10-6	8	i	-2.94 m 10 <sup>-6</sup>	:	-5.13 H 10 <sup>-5</sup>
11100	2,431.91	-6.97	15,129.6	-1.44 = 10-3	2,906.5	-1.33 x 10 <sup>-3</sup>	4.75	-1.95 x 10 <sup>-6</sup>	8	:	-1.95 m 10 <sup>-6</sup>	:	-1.41 # 10 <sup>-5</sup>
May	2,652.55	-3.10	39,129.6	-4.90 a 10 <sup>-3</sup>	2,906.5	-5.94 x 10 <sup>-4</sup>	4.75	-9.44 × 10-7	5	:	-9.44 x 10 <sup>-7</sup>	=	-1.65 # 10 <sup>-5</sup>
-	2,736.76	1.3	35,129.6	-9.12 # 10 <sup>-3</sup>	2,906.5	-1.10 . 10-4	4.75	-1.30 x 10 <sup>-6</sup>	3	!	-1.30 # 10-4	=	-2.27 # 10-5
Yint	2,747.39	1.24	15,129.6	-1.01 = 10-2	7.904.5	-1.54 m 10 <sup>-3</sup>	4.75	-2.45 ± 10 <sup>-6</sup>	8	:	-2.45 ± 10 <sup>-6</sup>	5	-4.27 # 10-5
August	2,663.00	-13.05	15,129.6	-3.04 m 10 <sup>-2</sup>	2.906.5	-2.30 m 10 <sup>-3</sup>	4.78	-4.11 = 10 <sup>-6</sup>	3	:	-4.11 × 10 <sup>-6</sup>	=	-7.10 H 10-5
a de la compact	2,494.66	-17.46	35,129.6	-3.63 = 10^2	3,986.5	-J.36 x 10 <sup>-3</sup>	4.75	-5.16 # 10 <sup>-6</sup>	3	:	-5.10 m 10 <sup>-6</sup>	=	-9.06 m 10-5
October	2,420.90	-16.95	35,129.6	-3.72 m 10 <sup>-2</sup>	2.906.5	-J.16 = 10 <sup>-3</sup>	4.75	-5.03 a 10 <sup>-6</sup>	<b>3</b>	:	-5.03 x 10 <sup>-6</sup>	:	-8.79 m 10 <sup>-5</sup>
Hovember	2, 473.61	-12.37	15,129.6	-3.72 H 10 <sup>-2</sup>	2,986.5	-2.31 1 10-3	4.75	-3.67 a 10 <sup>-6</sup>	5	ł	-3.67 m 10 <sup>-6</sup>	=	-6.42 H 10-5
Dec autor	3,404.14	-11.92	35,129.6	-2.62 # 10 <sup>-2</sup>	2,986.5	-2.22 # 10-3	4.78	-3.50 × 10 <sup>-6</sup>	8	1	-3.34 a 10 <sup>-6</sup>	•	-4.18 x 10-5

<sup>\*</sup> Total organic carbon.

No met detected.

Mogetive sign designates conteminant nigration toward the river.

Source: Ecology and Environment, Inc. 1980.

<sup>\*\*</sup> Pelymeclear arematics.

Table E-2

CONTAMINAT LOADING TO HITCH DUE TO HORIZONTAL FLOW IN SITE H

		Herisental	<b>10C</b>	1	V-1-11-1-		Carcinogonic PMAs** Loading		Hon-Carcinogenic PMAs**		Total Puber: Tatal PCDs	Tatal PCI	
		Flow Rote Q Ave. Come.	Ave. Come.	to River	Ave Cenc	to Myer	Ave. Cenc.	to Miver	Ave. Conc.	** 11***	Londing to Ave. Conc.	Ave. Cesc.	20418 03
	(e, 3)	(ft <sup>3</sup> /doy)	(1/84)	(15/407)	(1/Pa)	(16/day)	(1/94)	(1 <b>b/doy</b> )	(uq/L)	(1b/doy)	(lh/doy) - River (lh/day) - (uq/L)	(mg/L)	(16/day)
Jenuery	0.612.06	-0.465	13,370.30	-3.57 = 10-2	9,901.60	-1.74 x 10 <sup>-2</sup>	8	:	•	-0.72 m 10 <sup>-6</sup>	-0.72 # 10-6	•	-3.02 x 10 <sup>-5</sup>
Pobruory	0,534.10	<b>-</b> 0.504	12,270.20	-3.07 . 10-2	5,901.60	-1.00 = 10-2		:	•	·9.45 = 10 <sup>-4</sup>	-9.45 E 10-4	•.	-3.30 × 10 <sup>-5</sup>
Merch	0.797.10	-0.360	12,270.30	-2.03 a 10 <sup>-2</sup>	5,901.60	-1.36 . 10-2	8	1	•	4.93 = 10-4	-6.92 # 10 <sup>-6</sup>	•	-2.40 E 10 <sup>-5</sup>
***	0,502.16	-0.275	12,270.20	-2.11 ± 10 <sup>-2</sup>	3,901.60	-1.03 x 10 <sup>-2</sup>		+	•	-J. 64 a 10 <sup>-6</sup>	-3.44 m 10 <sup>-6</sup>	10.4	-1.79 = 10-5
Am	9.030.00	-0.127	12, 270.20	-9.75 m 10 <sup>-1</sup>	3,901.60	-4.75 = 10-3	8	1	•	-2.30 = 10 <sup>-6</sup>	-7.30 m 10 <sup>-6</sup>	•	-0.26 E 10 <sup>-6</sup>
i	9,200.30	-0.167	12,270.20	-1.20 = 10-2	3,901.60	-6.24 × 10 <sup>-3</sup>	3	ł	•	-1.11 = 10-6	-3.13 # 10 <sup>-6</sup>	•	-1.09 x 10 <sup>-3</sup>
July	9,564.73	-0.207	12,270.20	-2.20 x 10 <sup>-2</sup>	9,901.60	-1.07 K 10 <sup>-2</sup>	8	;	J	-9.30 E 10 <sup>-6</sup>	-5.30 m 10 <sup>-6</sup>	10.4	-1.87 × 10 <sup>-5</sup>
August	9,150.21	-9.050	12,270.20	-3.51 x 10 <sup>-2</sup>	5,901.60	-1.71 = 10-2	8	1	w	-0.39 E 10 <sup>-6</sup>	-0.59 x 10 <sup>-6</sup>		-2.90 m 10 <sup>-5</sup>
	9,042.74	-0.397	12,270.20	-4.30 E 10 <sup>-2</sup>	5,901.60	-2.23 = 10 <sup>-2</sup>	8	ł	<b>.</b>	-1.12 x 10 <sup>-9</sup>	-1.13 m 10 <sup>-5</sup>		-3.00 x 10 <sup>-5</sup>
October	0.735.69	-0.577	12,270.20	-4.43 K 10 <sup>-2</sup>	3,911.60	-3.16 x 10 <sup>-3</sup>	8	ŀ	•	-1.00 x 10-5	-1.00 m 10 <sup>-5</sup>	۲۰.۰	-3.75 a 10 <sup>-5</sup>
Bevenber	0,009.21	-0.462	12.270.20	-).95 m 10 <sup>-2</sup>	3,901.60	-1.73 # 10-2	8	1	•	-1.66 H 10-6	-0.66 m 10 <sup>-6</sup>	<b>.</b> .	-).00 x 10 <sup>-5</sup>
Pocember	9,012.03	-0.424	12.270.20	-3.25 a 10 <sup>-2</sup>	5,961.60	-1.39 E 10 <sup>-2</sup>	8	1	•	-7.95 x 10 <sup>-6</sup>	-7.95 a 10 <sup>-6</sup>	10.4	-2.76 x 10 <sup>-5</sup>

<sup>\*</sup> Total organic carbon.

Megative sign designates contominant migration toward the river.

Bearce: Scalegy and Environment, Inc. 1900.

<sup>\*\*</sup> Pelymuclear arematics.

NO Not detected.

Table E-)

CONTAMINANT LAADING TO RIVER BUT TO HORIBONTAL FLOW IN SITE 1

		Her i seatel	100.	7	Weletiles	Leading	Carcinegenic Pilha." Leading	resis.	Hon-Carcinogenic PRAs** Leading	Looding	Total Pula" Total PCDs	Total PCBs	10.00
	Area	Flow Rate @ Ave. Conc.	Ave. Conc.	to Biver	AVE. CORC.	to Biver	Ave. Come.	to River	Ave. Comc.	to Biver	Leading to Ave. Comc.	Ave. Comc.	to River
	- - -	(ft. <sup>3</sup> /day) (ug/L)	(2/60)	(1b/day)	(mg/L)	(15/day)	(1/41)	(18/4ey)	(ug/L)	(18/4ay)	(lb/day) Biver (lb/dey) (ug/L)	(mg/L)	(1b/day)
Japasey	0.103.99		9.736.63	-0.442 9,736.63 -1.90 a 10 <sup>-2</sup>	1,384.5	-3.33 ± 10 <sup>-3</sup>	2	1	3.30	4.34 a 10-4	-9.34 a 10 <sup>-6</sup>	2	!
Pobruery	6.060.17	-0.467	5,736.63	5,736.63 -1.67 a 10-2	1,204.5	-3.52 s 10 <sup>-3</sup>	1	ı	3.30	-9.67 a 10-6	-9.67 = 10-6	2	;
Nerch	1,190.34	-6.344	8,736.63	5,736.63 -1.23 x 10-2	1,204.9	-2.59 E 10 <sup>-3</sup>	•	ı	3.30	-7.17 x 10-6	-7.27 ± 10 <sup>-6</sup>	2	;
<b>A</b>	0.102.99	-0.254	5,736.63	5,736.63 -9.11 a 10-3	1,204.5	-1.91 = 10-3	1	1	3.36	-5.37 a 10 <sup>-6</sup>	-5.37 s 10 <sup>-6</sup>	2	;
į	6.597.51	-0.129	8,736.63	-4.63 x 10 <sup>-3</sup>	1,204.5	-9.71 E 10 <sup>-0</sup>	1	1	3.30	-2.33 a 10-6	-2.73 x 10 <sup>-6</sup>	2	;
	1,619.63	-0.154	8,736.63	5,736.63 -5.59 x 10 <sup>-3</sup>	1,204.5	-1.17 a 10 <sup>-3</sup>	1	ı	3.30	-3.30 ± 10 <sup>-6</sup>	-3.30 = 10-6	2	;
July	0.012.45	4.36	8,736.63	9,736.63 -9.47 x 10 <sup>-3</sup>	1,204.5	-1.90 = 10-3	1	ı	9:30	-9.90 n 10-6	-9.96 x 10 <sup>-6</sup>	2	;
August	0.612.06	-0.431	8,736.63	5,736.63 -1.55 m 10-2	1,204.5	-3.24 × 10 <sup>-3</sup>		ł	3.30	-9.10 a 10"6	-0.10 = 10 <sup>-6</sup> ,	2	;
Soptomber	. 305.00	-1.596	\$.736.63	8,736.63 -1.99 E 10-2	1,364.5	-4.19 = 10-3		:	3.30	-1.17 = 10 <sup>-5</sup>	-1.17 # 10 <sup>-5</sup>	2	;
October		1.30	8,736.63	9,736.63 -1.97 m 10-2	1,204.9	1.97 # 10-2	2	ł	3.30	-1.16 : 10-5	-1.16 # 10-5	2	;
	1,229.00	-0.420	8,736.63	5,736.63 -1.51 m 10-2	1,204.9	-3.16 E 10 <sup>-3</sup>	1	ł	3.30	-0.87 # 10-6	-0.87 a 10 <sup>-6</sup>	2	;
2.4	1,459.33	-4.355	8,736.63	8,736.63 -1.27 m 10-2	1,204.5	-2.67 : 10-3	1	1	3.30	-7.90 x 10-6	-7.50 ± 10 <sup>-6</sup>	2	;

<sup>\*</sup> Total organic carbon.

<sup>.</sup> Polymechest arematics.

Wo Not detected.

Degetive algm designates contaminant migration toward the river. Source: Scalogy and Environment, Inc. 1998

Table E-4

CONTANIDANT LOADING TO BITCH DOE TO BORISONTAL FLOW IN SITE L

		Horisontal	1001	Landing	Velatile.	Butpoor	Carcinogonic PMAs**	Perpen	Non-Carcinogenic Phas. Loading Total Phas. Total PCDs	Loading	Total PHAG.	Total PCDs	5-61-9
	<u>۲</u> ٠٠	Flow Rate Q Ave. Conc.	Ave. Cesc.	to Biver	Ave. Cenc.	to River	Ave. Cesc.	to River	Ave. Cenc.	to Biver	to Hiver Leading to Ave. Conc. to Hiver	Ave. Cesc.	** Bive!
	2	(ft <sup>3</sup> /day) (uq/L)	(1/4)	(1h/day)	(1.00 m)	(1b/day)	(mg/t.)	(1b/day)	(4/4)	(1b/day)	lb/day  Hiver (lb/day) (ug/L)	(3/E)	(16/day)
Jenusty	2,005.57	-10.03	2,602	-1.76 # 10-3	1.390	-9.41 x 10 <sup>-4</sup>	*		80	:	:		1
Pobrucry	1,976.40	-11.27	2,602	-1.03 . 10-3	1.390	-9.79 E 10 <sup>-4</sup>	8	:	8	1	1		1
Merch	2,022.24	<b>.</b> •	3,603	-1.30 # 10-3	1,390	-7.38 ± 10 <sup>-4</sup>	8	1	3	ŀ	1	•	1
4011	1,997.24	4.30	2,003	-1.04 = 10-3	1,390	-3.55 m 10 <sup>-4</sup>	<b>3</b>	:	3	1	1	3	ŀ
7	2.420.05	-3.07	2,602	-6.29 m 10 <sup>-4</sup>	1,390	-3.36 x 10 <sup>-4</sup>	8	:	8	ŀ	1	8	;
•	2,236.41	1.1	2,602	-6.52 m 10 <sup>-4</sup>	1,390	-3.40 s 10 <sup>-4</sup>	8	1	3	1	ł	8	ł
July	2,240.29	-6.72	2,602	-1.09 H 10 <sup>-3</sup>	1,390	-5.04 a 10 <sup>-4</sup>	8	!	8	1	1	3	ŀ
August	2.175.02	-10.00	2,602	-1.77 : 10-3	1.390	-9.45 x 10 <sup>-4</sup>	3	ł	8	;	;	8	;
ing to make r	2,000.57	-13.94	2,602	-2.37 E 10 <sup>-3</sup>	1.390	-1.21 . 10-3	8	1	8	t	1	3	<b>;</b>
October	2.015.29	-13.50	2,602	-2.20 = 10-3	1,190	-1.17 x 10-3	5	1	3	ì	ł	8	}
Bevenber	2,030.57	-10.56	2,402	-1.72 x 10-3	1,390	-9.17 x 10-4	8	<b>;</b>	NO D	1	1	3	1
	2,000.06	-9.01	2,603	-1.60 m 10 <sup>-3</sup>	1, 190	-1.52 : 10-4	3	:	5	1	!	8	<b>!</b>

<sup>·</sup> Total organic carbon

Regative sign designates conteminant migration toward the river.

Desires: Resisey and Environment, Inc. 1986.

<sup>\*\*</sup> Pelynuclear aremetics.

MO Bet detected.

Table E-5

CONTANISMET LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE O

	*	Vertical	TOCS*	: ## I	volatiles Ave. Conc.		Carcinogonic PMAs** Ave. Conc.		Non-Careimpponic PMAs** Loading Ave. Cenc. to Biver		Total PRAc** Total PCBs	Total PCBe	
	(£3)	(ft <sup>3</sup> /day)	(14g/L)	(1 <b>5/doy</b> )	(# <b>4</b> /L)	(1b/day)	(1/ <b>%</b> )	(lb/day)	(m4/r.)	(1 <b>b/day</b> )	(lh/day) Biver (lh/day) (uq/L)	<u>.</u>	
Jesusy	79, 751	0,670.29	38,139		2,986.5	1.61	4.75	2.97 = 10-3	3		2.57 # 10-3	=	1.49 # 10-2
Pobruory	79, 751	0,026.00	35,129	19.34	2,986.5	1.64	4.79	2.61 # 10 <sup>-3</sup>	8	:	2.61 x 10~3	=	1.57 x 10 <sup>-3</sup>
Mer ch	79, 751	0,026.04	39,129	19.34	2,906.5	1.64	4.75	2.61 . 10-3	5	:	3.61 x 10 <sup>-3</sup>	2	4.57 # 10-2
11194	79.751	3, 041.92	39,139	•.42	2,906.9	•. 72	4.79	1.14 . 10-3	8	:	1.14 = 10-1	2	1.99 . 10-2
Tay Y	79, 791	7.707.69	15,129	17.06	2,986.5	1.45	4.75	2.31 # 10-3	3	:	2.31 a 10 <sup>-3</sup>	2	1.03 # 10-2
į	79,751	0,026.04	35,139	19.34	2,986.5	1.64	4.75	2.61 # 10-3	8	:	2.61 × 10-3	2	4.57 # 10 <sup>-3</sup>
July	79, 751	1,306.06	35,139	10.20	2,906.5	1.55	4.75	2.46 . 10-3	8	:	2.46 = 10-3	=	4.30 = 10-2
August	79,731	6,230.13	35,139	13.65	2,906.3	1.16	4.75	1.05 . 10-3	8	:	1.05 # 10-3	:	). 22 <b>.</b> 10 <sup>-2</sup>
Soptomber	79,791	3,191.79	35,129	11.37	2,986.5	0.97	4.75	1.54 x 10-3	3	ì	1.94 = 10-3	=	2.69 a 10-2
Oct ober	79,751	6,749.33	35,129	14.79	2,986.5	1.26	4.75	2.00 = 10-3	8	:	2.00 # 10-3	=	J. 49 # 10 <sup>-2</sup>
To vo die r	79,751	0,026.04	35,139	19.34	2,986.5	1.64	4.75	2.61 = 10-3	8	1	2.61 = 10-3	2	4.57 # 10-3
Decomber	79.751	9,305.22	35,139	30.47	2,986.5	1.74	4.75	2.77 = 10 <sup>-3</sup>	8	1	2.77 # 10-3	=	1.11 # 10-2

<sup>\*</sup> Total organic earbon.

<sup>\*\*</sup> Polymeclear aremetics.

ND Wet detected.

Regardive edge designates contaminant migration toward the river.

Source: Scology and Environment, Inc. 1980.

Table E-6

CONTAMINANT LOADING TO RIVER BUE TO VERTICAL FLOW IN SITE H

		Vertical	10C+	-	Volutiles.	Landing.	Carcinogenic PHAs.**		Hen-Catcinegenic PHAs**	Files	Total Pmas.	Total Pcae	F
	<b>:</b>	Flow Bets Q Ave. Cenc.	Ave. Cenc.	to River	Ave. Comc.		Ave. Copc.	to Biver	Ave. Cenc.	to Hiver	beipeer	Ave. Come.	10 Biver
	(2. <sup>2</sup> )	(ft <sup>3</sup> /day) (wg/L)	( <b>44</b> /L)	(lb/day)	(ug/L)	(1b/day)	(1/24)	(1 <b>b/do</b> y)	( <b>vg/L</b> )	(15/day)	Biver (1b/day)	(uq/L)	(1b/day)
Assess	116,540	13,696.16	12,270	10.46	3.901.6	3.00	3	!		2.56 = 10-3	2.56 = 10-3	•	•. • · · · · · ·
Pobruary	116,340	14,414.03	12,270	11.00	3, 101.6	5.30	8	1	•	2.70 m 10 <sup>-3</sup>	2.70 = 10-3	•	9.35 × 10 <sup>-3</sup>
March	116.340	14,414.03	12,270	11.	9.101.6	<b>5.34</b>	8	1	•	2.70 = 10-3	2.70 = 10-3	<b>.</b>	9.35 x 10 <sup>-3</sup>
4:11	116,540	3,007.26	12,270	J. 63	5,901.6	1.07	3	;	•	9.37 = 10-4	9.37 H 10 <sup>-4</sup>		3.25 ± 10 <sup>-3</sup>
May	116,540	10,621.46	12,270	•.=	9.901.6	3.96	8	;	•	1.99 . 10-3	1.99 R 10-3	•	6.09 R 10 <sup>-3</sup>
Ĭ.	116,540	12,007.40	12,270	· ·	3.100.6	•.•	8	1	•	2.41 = 10-3	2.41 H 10 <sup>-3</sup>	1.4	8.37 a 10 <sup>-3</sup>
July	114,500	13,097.00	12,270	•	5,901.6	•.•	8	1	•	2.01 = 10-3	2. 61 = 10-3	10.4	8.37 # 10 <sup>-3</sup>
August	116,540	11,300.13	12,270	17.9	5,901.6	1.25	8	;	<b></b>	3.13 # 10 <sup>-3</sup>	2.13 m 10 <sup>-3</sup>	10.4	7.38 = 10-3
September	114.340	10,621.46	12,270	•	5, 911.6	3.16	3	I	•	1.99 × 10-3	1.99 m 10 <sup>-3</sup>	10.4	6.09 x 10 <sup>-3</sup>
October	116.540	11,300.13	12,270	9.71	3,901.6	4. 25	8	;	•	2.13 m 10 <sup>-3</sup>	2.13 m 10 <sup>-3</sup>		7.30 x 10 <sup>-3</sup>
-	116,340	12,097.40	12,270	•.	5,911.6	1.01	3	:	•	2.41 x 10-3	2.41 m 10-3	•.•	1.37 . 10-3
December	116,300	13,696.16	12,270	10.00	5,901.6	<b>5</b> . ••	5	;	•	2.56 x 10 <sup>-3</sup>	2.56 × 10 <sup>-3</sup>	•	1.06 x 10 <sup>-3</sup>

<sup>\*</sup> Total ergenic carbon.

Hogotive eign designates contaminant migration toward the river.

Bource: Eculogy and Environment, Inc. 1968.

<sup>\*\*</sup> Pelynuclear arematics.

no set detected.

Table E-7

CONTAMINANT LOADING TO SIVES SOR TO VERTICAL FLOW IN SITE I

		Vertical	100.	Pedding.	W-111100	-	Carcinogonic File. Leading		Men-Carcinegenic PNAs		Tetal Pike: Tetal PCie	Tetal PC	
	<b>&gt;</b>	Flow Rate 0	Ave. Cenc.	to Miver	Ave. Ceac.	E Miver	Ave. Cenc.	to River	Ave. Cenc.	nevit es	Loading to Ave. Conc.	Ave. Conc.	te Biver
	<u> </u>	(ft <sup>3</sup> /day)	(1/64)	(15/day)	(ug/L)	(1b/day)	. (mg/L)	(lb/day)	(1/5n)		(lb/day) River (lb/day) (uq/L)	194/11	(1b/doy)
Jenuery	164,441	10,190.60	9,734.4	18:3	1.204.5	1.37	3	1	3.30	J. 84 E 10-3	J. 44 . 10-3	5	1
Pebruary	144,441	19,269.30	5,736.6	•	1,204.5	1.45	3	:	3.30	1.86 # 10-3	1.06 = 10-3	8	I
Herch	160,661	19, 269. 20	5,736.6	•	1,204.5	1.45	8	ı	J.18	1.06 = 10-3	1.06 = 10-3	3	1
April 1	164,441	7,600.63	5,736.6	2.73	1,204.5	9.57	8	;	3.30	1.60 # 10-3	1.6 = 10-3	3	1
To y	164,441	14,987.18	5.736.6	\$.56	1,204.5	1.13	3	i	3.38	3.16 m 10 <sup>-3</sup>	3.16 x 10 <sup>-3</sup>	8	1
June	164,441	10.190.69	3,736.6	18.9	1,104.5	1.37		ł	¥.¥	J. 84 . 18-3	J. 84 . 10 <sup>-3</sup>	3	:
July	164, 441	17,120.17	5,736.6	6.13	1,204.5	1.29	8	i	1.10	3.61 T 10-3	3.61 x 10-3	8	1
August	164,441	14,907.15	5,736.6	3.36	1,204.5	1.13	3	ŀ	J.30	3.16 x 10 <sup>-3</sup>	J.16 = 10-3	3	1
Soptomber	160,441	13,916,64	5,736.6	• •	1,204.5	1.05	8	i	J. 10	2.93 x 10 <sup>-3</sup>	2.93 m 10 <sup>-3</sup>	3	:
October	164, 441	14,907.18	5,736.6	9.36	1,204.5	1.13	8	1	3.30	3.16 x 10 <sup>-3</sup>	J.16 x 10-3	3	i
******	164,441	10.190.49	9,736.6	6.91	1,204.5	1.37	3	i	3.30	3.86 = 10-3	J. 64 R 10-3	8	1
December	164,441	19,269.20	9,736.6	• • •	1,204.5	1.45	3	:	. 3.30	1.06 2 10-3	4.46 # 10 <sup>-3</sup>	3	:

<sup>·</sup> Total organic carbon.

Hogetive sign designates contaminent migration toward the river.

Source: Scology and Saviconpost, Inc. 1908.

<sup>· ·</sup> Polymuclear aremetics.

He Set detected.

Table 6-0

CONTANINANT LOADING TO RIVER DUE TO VERTICAL PLOW IN SITE L

		Vertical	100	-	Velatiles	Losding	Carcinegenic PAAs**	1. F. S.	Loading Carcinegenic Plate Leading Hon-Carcinegenic Plate.	\$41P**	Total PMAs** Total PCBs	Total PCBs	Loading
	Ares	Flow Bate Q Ave. Conc.	AVS. CORC.		to Biver Ave. Conc.	to Biver	Ave. Cesc.	to Birec	Ave. Conc.	to Biver	Loading to Ave. Coac.	Ave. Conc.	to Biver
	(cc <sub>2</sub> )	(ft 3/day) (ng/L)	(1/da)	(15/day)	(mg/L)	(1b/day)	(7/6n)	(1b/day)	(mg/L)	(15/dey)	(1b/day) hiver (1b/day). (ug/L)	(1/m) .	(18/day)
Jamary	25.679.5	2,942.10	2,60	4.77 # 10 <sup>-1</sup>	1.39	2.55 ± 10 <sup>-1</sup>	2	1	2	;	:	8	1
Pobruery	25,678.5	3,176.17	2,602	5.15 m 10 <sup>-1</sup>	1,390	2.75 x 10 <sup>-1</sup>	£	1	2	1	1	2	1
Merch	25,678.5	3,176.17	2.662	9.15 m 10 <sup>-1</sup>	1,390	2.75 a 10 <sup>-1</sup>	2	ł	2	;	ţ	8	ı
Aprili	25,676.5	1,153.45	2,602	1.07 m 10 <sup>-1</sup>	1,390	1.00 = 10-1	· g	;	2	1	1	2	1
į	25,678.5	2,340.34	2,602	3.00 s 10 <sup>-1</sup>	1,390	2.0) = 10 <sup>-1</sup>	2	ì	•	;	1		ł
June	25,670.5	1,641.04	2,662	4.61 # 10-1	1,390	2.06 x 10 <sup>-1</sup>	2	;	9	;	;	2	ł
July	23.670.3	2,041.34	2,602	4.61 m 10-1	1,390	2.66 H 10-1	2	;	£	;	;	2	:
August	25,676.5	2, 346.34	2.607	3.00 m 10 <sup>-1</sup>	1,390	2.03 ± 10 <sup>-1</sup>	2	1	2	;	:	2	;
September.	25,678.5	2,173.17	2,662	1.53 . 10-1	1.39	1.00 R 10 <sup>-1</sup>	2	;	2	;	;	2	ı
Oct ober	25.670.5	2, 346.34	1,602	3.00 . 10-1	1,300	1.01 # 10-1	2	;	2	;	;	2	;
nevember.	25,670.5	2,041.04	2,603	4.61 x 10-1	1,390	2.46 x 10 <sup>-1</sup>	1	;	9	:	}	2	1
December	25,670.9	3,000.00	2.602	4.00 m 10 <sup>-1</sup>	1,390	2.61 H 10-1	2	ł	•	;	;	1	

. Total organic carbon.

.. Pelynuclest atematics.

MD Met detected.

Begetive sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-9

## CONTAMINANT LOADING TO RIVER DUE TO HORISONTAL FLOW AT SHALLON SOME IN SITE O\*\*\*

												,	
			100		Veletile.							tetel PCBe	
			To 1 th 1 od	<b>Pe15</b>	Weighted.	bespeed	Corrinogenie Pha:.	Landing.	Bon-Careinogonic PRAs** Loading Total PRAs** weighted	7	Total PRAS"		Pe ibee 2
	***	Flow Rate Q Ave. Conc.	Ave. Cesc.	7047	Ave. Cenc.	to Biver	Weighted Ave. Conc.	to Biver	Waighted Ave. Conc.	to Biver	to Hiver Leading to Ave. Coac.	Ave. Cesc.	te Biver
	(m²)	(ft <sup>2</sup> ) (ft <sup>3</sup> /day)	( <b>1</b> /2)	(lb/day)	(ug/L)	(15/day)	(1/4)	(16/day)	(ug/L)	(1 <b>h/day)</b>	(lh/day) River (lh/day) (mg/L)	(14/2)	(1b/day)
Jenuery	95.142	-709.69	132,000	7.5	119,000	-5.07	8	:	3	1	:	8	,
Tobrusty	94,729	-672.50	132,000	-3.33	119,000	<b>.</b>	8	:	8	:	ŀ	8	;
March	10,260	-122.03	132,000	-1.01	119,000		8	:	8	ŀ	1	8	1
2011	193,660	359.27	132,000	2.96	119,000	2.67	3	<b>!</b>	8	:	;	8	:
Ray	111,033	335.50	132,000	2.77	119,000	2. 6	3	ł	8	:	1	8	:
JES	111.270	-44.91	112,000	-0.37	119,000	1.5	8	ŀ	8	1	:	8	:
July	107.547	-451.70	132,000	-1.73	119,000	-1.16	8	:	8	:	:	3	:
2 supust	99.691	-917.16	111,000	-7.57	119,000	÷	8	:	8	1	ŀ	•	1
september	\$4,120	94,120 -1,039.41	132,000	-1.54	119,000	-7.70	8	:	8	1	:	3	1
October	93,113	-075.27	132,000	-7.22	119,000	<b>-6.5</b> 1	8	:	8	1	<b>!</b>	8	;
He venter	99,654	-310.00	132,000	-2.63	119,000	-2.37	5	:	3	;	1	8	<b>:</b>
December	100,029	-470.13	133,000	<b>-</b> 3.00	119,000	-1.30	8	:	8	1	ı	8	ŀ

<sup>·</sup> Total Organic Carbon.

Mogative eign designetes contaminant migration toward the river.

Source: Scalegy and Environment, Inc. 1988.

<sup>\*\*</sup> Polymecleor promotics.

<sup>\*\*\*</sup> Data from monitaring wells EE-21, EE-23, EE-23, end EE-24 were used to calculate weighted average concentrations.

<sup>80</sup> Not detected.

Table 6-10

CONTAMINANT LOADING TO RIVER BUT TO NORISONTAL FLOW AT INTERMEDIATE BOME IN SITE O...

			Toc.		Voletiles		•					Total PCBs	
			Weight od	Looding	weight od	Loading	Carcinogenic PRAs** Leading		Hen-Cercinegenic PHAs.	Les ding	Total PRAs	Me Ight od	tu șp est
	Area	Flow Rote Q	Area Plev Rate Q Ave. Conc.	to Biver	te Biver Ave. Cenc.	to Biver	Melghted Ave. Conc. to Biver	to Biver	Weighted Ave. Conc.	to Biver	Loading to	Ave. Conc.	to River
	187	(ft 3/40y)	(ftt <sub>2</sub> ) (ftt <sup>3</sup> /40y) (uq/L)	(17/40p) (nd/L)	(##/F)	(15/4ey)	(1/84)	(18/4ey)	(7/84)	(1b/dey)	River (13/day)	(7/ån)	(15/46y)
James	\$2,363	-434.63	3	-0.00259	ıı	-0.001917	2	,	2	:	:	2	:
Pobrusty	92,363		•	-0.0033	11	-0.00165	8	ŧ	2	ŀ	ŀ	2	:
March	\$2,363	-62.83	=	-0.00039	ıı	-0.00620	8	i	2	ł	1	2	;
April	52,363	178.03	•	0.00111	ĭ	•• . 000 70	8	ı	2	;	ł	2	;
į	92,363	157.69	=	0.0003	ı		2	i	2	1	;	2	;
, see	\$2,363	-20.95	•	-0.00013	ı	-0.00003	2	ł	2	ł	1		;
July	91,363	-219.93	•	-0.00137	11	-0.000976	2	;	2	;	1	2	:
August	\$1,363		:	<del>.</del>	ıı	-0.00214	2	ł	2	ŧ	1	2	;
Bopt oabor	\$2,363	-576.00	•	-0.0036	יי	-0.00256	2	1	<b>a</b>	;	1	2	:
October	\$2,363	-492.23	•	-0.0031	ı	-0.00210	2	ł	2	;	1	2	i
Bovember	\$2,363	-167.87	:	-0.00104	ŗ	-0.00014	2	ť	2	ł	:	2	;
December	92,363	92,363 -246.10	•	-0.00134	ı	-0.00109	2	:	2	:	:	2	:

\* Total organic carbon.

.. Polynuclear aremetics.

\*\*\* Data from memitering wells anish and amide (dereghty & Miller 1986; 1986s) were used to calculate

velented average calculations.

MD Not detected.

Megative sign designates centeninant migration toward the civer.

Source: Scolegy and Environment, Inc. 1988.

Table E-11

# CONTANIBART LOADING TO RIVER DUE TO BOBISORTAL FLOW AT SHALLOW SOME IN SITE Q\*\*\*

			100.		V-1:11100							Total PCDs	
			We I ght ed		No 1 phr od	<b>Pe1pe-1</b>	Carcinogenic PRASO		Ben-Carcinogenic PHA:		Total PRAc.	weighted	P=10-21
		Flow Rate Q Ave. Conc.	Ave. Cene.	10478 03	Ave. Cesc.	to Biver	Weighted Ave. Comc.		Meighted Ave. Conc.	to River	Landing to	Ave. Comc.	to Biver
	(R.)	(ft <sup>3</sup> /doy) (ug/L)	(m4/L)		(1/64)	(16/day)	(ug/L)	(Ib/day)	(ug/L) (lb/day) River (lb/day) (ug/L) (lb/day)	(1b/dey)	Hiver (1b/day)	(uq/L)	(1b/day)
January	105.170	-1,369.32	225	-0.03011	130	-0.01112	5	•	8	:	;	3	!
Pobruoty	100,001	-067.42	225	-0.0127		-0.00700	3	1	3	ŀ	1	5	1
March	135.036	763.21	215	0.0119	130	91900.0	8	1	3	ŀ	:	8	1
Apr 11	146,401	1,351.05	215	0.0220	134	•. 01261	3	1	3	;	1	8	;
A	150,783	889.62	215	0.01307	•	0.00723	3	1	3		!	8	<b>!</b>
J.	140,015	-267.95	235	-0.00393	=	-0.00217	8	1	3	:	:	8	:
July	129,237	-930.65	215	-0.01367		-0.00756	\$	;	8	ŀ	;	8	!
hugust	100,349	-1,639.10	215	-0.0241	•	-0.01330	8	ł	3	1	:	3	1
September	99,130	-1,336.78	215	-0.0229	130	-0.01265	8	;	3	1	;	8	1
oct ober	101.733	-1,130.40	235	-0.0166	5	-0.0020	3	:	3	!	;	8	:
-venter	120,390	372.3"	235	•. •• \$ \$	130	•. ••.	3	1	3	ı	:	8	ı
December	121.359	-594.63	215	-0.0007	¥	-1.0003	**	1	\$	:	:	5	;

<sup>\*</sup> Total ergenic cerbon.

Regative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

<sup>·</sup> Polynuclear arematics.

<sup>\*\*\*</sup> Data from monitoring wells EE-09, EE-10, and EE-06 were used to calculate weighted average concentrations.

HD Het detected.

Toble E-12

CONTAMINANT LOADING TO RIVER DUE TO NOBLIGHTAL PLOW AT SHALLOW SOME IN SITE A...

			100.		Velatiles							Total PCBs	
			Weighted	Perding.	W. ight od	Loading	Carcinogenic PHAs**	Loading	Hon-Carcinogenic PHAs"	Conding.	Total PRAS".	We ight od	Leading.
	Pr.	Flow Bate Q Ave. Conc.	Ave. Comc.	to Biver	Ave. Conc.	to Biver	Weighted Ave. Conc.	to River	Weighted Ave. Conc.	to Biver	Loading to	Ave. Cenc.	to Biver
	(44,)	(ft. <sup>2</sup> ) (ft. <sup>3</sup> /day) (ug/L)	(ng/L)	(115/doy) (ug/L)	(1/bn)	(1b/day)	(mg/L)	(1b/doy)	(mg/L)	(18/dey)	(lb/day) . Biver (lb/day) (ug/L)	(1/ <b>6</b> /L)	(1b/dey)
Jamesty	\$2,293	-052.30	12,910	19.01	1,995	•	9	:	QI.		:	2	;
Pobruery	\$4,492	-403.25	12,910	<b>4.3</b>	1,995	-0.03	2	:	2	ı	1	2	;
March	67.015	137.117	11.510	1.3	1,999	6.673	2	ï	2	1	;	2	ł
April 1	72,696	1,068.00	11,510	•	1,555	0.1030	8	ŀ	2	;	1	2	:
Ray	74.011	11.11	12.510	•.33	1,955	•	£	ł	2	;	1	2	ł
June	69.003	-236.56	13,510	-0.10	1,955	-6.623	2	;	2	ł	1	<u>a</u>	;
July	64,148	-611.11	12,910	10.30	1,955	-0.062	9	1	2	1	i	2	;
August	53,671	-983.50	12,510	-6.75	1,999	-0.001	2	;	2	1	;	2	;
Sopt ember	49,318	-336.40	11,510	-0.43	1,939	-0.032	2	:	2	:	:	2	;
October	\$1.40	-861.16	12,510	÷.	1,995	-0.054	2	;	£	ł	1	2	;
Beverber	63.717	\$22.47	12,510	•	1,555	0.051	£	1	2	ł	ł	2	1
December	40.229	-361.37	12,510	10.20	1,555	-0.015	2	;	2	!	1	2	ł
							-						

<sup>·</sup> Total Organic Carbon.

<sup>\*\*</sup> Polynuclest Atematics.

<sup>\*\*\*</sup> Data from monitoring wells P-1, P-11, B-26A, and B-28A (Geraghty & Miller 1986; 1986s) were used to

calculate weighted average concentrations.

MD Hot detected.

Regative eign designates contaminant migration toward the river.

Source: Ecelogy and Environment, Inc. 1988.

Table E-13

CONTANIBANT LOADING TO RIVER DUE TO BORISONTAL FLOW AT INTERNEDIATE SOME IN SITE B\*\*\*

			100		Velatiles							Total PCDs	
			to ight od	Losding	mel shi ead	Localing	Carcinogenic PHA.		Hen-Carcinegenic Pake**	Losding	Total PEAs	#14ted	resting.
	<b>P</b>	Flow Rote Q	Plow Bate @ Ave. Conc.	to Biver	Ave. Conc.	to Biver	Melghted Ave. Conc.	to Biver	Melghted Ave. Conc.	to River	Looding to	Ave. Come.	to Biver
	(F)	(ft. <sup>3</sup> /day) (wg/L)	(mg/L)	(18/404)	(3/2)	(15/4ay)	(1/dn)	(15/day)	(mg/L)	(15/464)	River (15/day) (ug/L)	(1/5m)	(18/day)
Jenus ry	107.700	-74,313		-41.79		-29.62	2	;	2		:	2	
Pobruery	107,700			-13.33	••••	-6.57	£	;	2	1	i	2	1
Perch	107.700	62,666	. 998	18.13		17.33	£	;	2	ł		2	;
1114	107,700			39.63	• • •	19.57	£	i	2	1	:		;
Fe.	107,700			16.90	••••	1.34	2	;	2	ŀ	;		;
) em c	107,700			1.8	••••	-4.93	£	;	2	ł	;	: £	į
July	107,700	-43,003	. 99	-23.63	•••	-11.66	2	;	2	ı	;		:
Ampust	107,700			-46.03	••••	.n.	£	;	2	ŀ	;	: £	. :
September	107,700	-05,621		-40.15	•••	-13.76	£	;	2	;	1	£	: 1
Petober	107.700		0,990	-20.09	••••	-10.31	£	;	2	ŀ	I	. 2	: 1
Bovosbor	167,700	••. •65		27.25	••••	13.45	£	;	2	;	ŀ	: <b>£</b>	· :
December	107,700	-21,540	••••	-13.11	••••	-5.90	•	;	•	1		: :	

· Total Organic Carbon.

.. Polynucles: Arematics.

\*\*\* Date from momitering wells GH278 and GH288 (Geraphty a Hiller 1966; 1986m) were used to calculate

velghted average concentrations.

Wo Mot Detected.

Megative nign designates contaminant nigration toward the river.

Source: Scology and Environment, Inc. 1988.

## NAPHTHALENE

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of naphthalene (CAS No. 91-20-3) are summarized below (EPA 1984).

Molecular Weight (g/mole)	128
Water Solubility (mg/L at 25°C)	31.7
Vapor Pressure (mmHg at 25°C)	0.082
Henry's Law Constant (atm-m³/mole)	no d <b>ata</b> found
Log Kow	3.37
K <sub>oc</sub>	no data found
BCF	1.46

Naphthalene has a moderate water solubility and moderate vapor pressure. As a consequence of these two properties, benzene can be characterized as a moderately mobile chemical. For naphthalene release to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere.

Due to its moderate water solubility and moderate vapor pressure, transport to sediments is expected to be a major surface water fate process.

Naphthalene released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

## Noncarcinogenic Effects

Exposure to naphthalene by the ingestion, inhalation and dermal routes has been reported to result in intravascular hemolysis, corneal

ulceration and cataracts, eye irritation, headache, confusion, malaise, nausea, vomiting, and bladder irritation in humans. In severe cases hemolytic anemia with associated jaundice and occasionally renal disease and death have been reported. Individuals with a deficiency of glucose-6-phosphate dehydrogenase (G6PD) and infants appear to be at greater risk for developing hemolytic anemia.

In a study recently reported by Shopp et al. (1984) male and female CD-1 mice were exposed for 14 or 90 day by gavage to 3 different doses of the compound. Both males and females showed a 5-10% mortality and depressed body weights at the high dose of 133 mg/kg/day. At this dose the males had decreased thymus weights and the females had decreased spleen and increased lung weights. No toxic effects were observed at the two lower doses of 53 mg/kg/day and 27 mg/kg/day. For all exposure groups, no alterations were observed in the hepatic drug metabolizing system except for a dose-related inhibition of aryl hydrocarbon hydroxylase (AHH) activity.

Harris and coworkers (1970 as reported in USEPA 1982) reported a statistically significant increase in retarded cranial ossification and heart development in offspring of Sprague Dawley dams that had received intraperitoneal injections of 395 mg/kg naphthalene on days 1-15 of gestation. In a recent study by Plasterer and coworkers (1985) single doses of naphthalene were administered by gavage to pregnant CD-1 mice on days 7 through 14 of pregnancy. The compound was given at a dose estimated to be at or just below the threshold of adult lethality. A significant reduction in the average number of live pups per litter was reported for the naphthalene-dosed females.

## Carcinogenicity and Mutagenicity

Overall, the results of carcinogenicity testing with napthalene have been negative. Knake (1956 as reported in USEPA 1980) treated 40 white rats with 500 mg/kg of coal tar naphthalene in sesame oil subcutaneously every two weeks for a total of seven treatments. Five out of thirty-four rats developed invasive or metastatic lymphosarcoma prior to death. These result are equivocal, however, because the injection sites were first painted with carbolfuchsin (a known carcinogen) prior

to each injection. The naphthalene also contained approximately 10% methylnaphthalene.

In a second study, Knake (1956 as reported in USEPA 1980) painted a group of mice with either benzene or a solution of coal tar naphthalene in benzene and noted an excess of lymphatic leukemia in the group treated with the napthalene/benzene solution as compared to those treated with benzene alone (4 vs. 0 cases, respectively). These results are difficult to interpret because benzene is a known animal carcinogen.

Naphthalene when combined with rat microsomal fractions has been found to be nonmutagenic in bacterial mutagenesis assays (EPA 1980).

## Drinking Water Standards and Criteria

EPA has not developed any drinking water standards or health advisories or ambient water quality criteria for human health for napthalene.

## Environmental Chemistry and Fate

In the atmosphere, nickel exists predominantly as an aerosol. Atmospheric residence times depend on the nickel concentrations, the density and size of particles, and precipitation. The typical residence times of nickel in the atmosphere ranges from 1 to 21 days. Nickel species in the air most likely include soil minerals, oxide, and sulfates.

Depending on the chemical and physical properties of the water, nicekl exists in numerous soluble and insoluble forms in aqueous systems. Due to precipitation, iron oxide and manganese oxide are the primary determinants of the aqueous mobility of nickel. However, variation of other factors such as sulfate concentration and pH can significantly influence nickel's mobility.

Nickel is persistent in soils and has the potential to leach to groundwater. Sorption of nickel to soil is dependent on soil-water pH, total iron and surface area. Organic complexing agents in soil tend to restrict nickel movement due to formation of organo-nickel complexes. Nickel may also be immobilized as nickel ferrite, as other more common compounds (e.g., carbonates, sulfates, or halides) are too soluble to precipitate out of soil-water.

Nickel is moderately mobile in low pH and high cation-exchange capacity soils, but less mobile in mineral soils and soils with high organic content (ATSDR 1987j). Extractability of nickel from soil effects uptake by plant roots. The extractability is influenced by a number of complex physical, chemical, and biological factors.

Nickel is bioconcentrated in some aquatic organisms. Bioconcentration factors typically range from 20-1,000, with higher values for phytoplankton, algae, and seaweed.

## Noncarcinogenic Effects

Laboratory studies in animals have demonstrated depressed body weight gain, alterations in hematology parameters, cytochrome oxidase activity, and iron contents of organs following high oral nickel exposure.

Studies evaluating the effects of nickel administration on animal reproductive systems have produced varying results. Nickel is known to cross the placental barrier in animals, and some data suggest this is also true for humans. Intraperitoneal and intravenous injections of nickel compounds have produced some tetratogenic effects in animals. Increased fetal mortality and reduced fetal weights also were observed. In some studies, high dosages resulted in reduced fetal survival and decreased fetal weights in the absence of frank teratogenesis.

Feeding studies involving administration of various nickel compounds to rats are more applicable to human exposure situations. Various studies have reported a correlation between nickel concentration in food or water and reproductive performance (ATSDR, 1987b). Nickel exposure has also been reported to impair male gametogenesis in mice and rats. No adverse reproductive effects linked to nickel exposure have been reported in humans.

## Carcinogenicity and Mutagenicity

The chemical form and route of exposure may be important factors in determining the carcinogenic potential of nickel. Insoluble nickel compounds (e.g., metallic nickel, nickel subsulfide, and nickel carbonyl) have been shown to produce tumors following inhalation exposure. However, multiple studies in which nickel was administered orally to rats and mice have been uniformly negative (EPA 1985c). In humans, excess respiratory cancer mortality has been demonstrated in epidemiological studies of nickel smelting and refining workers.

EPA has classified nickel in group B<sub>2</sub>--sufficient evidence for carcinogenicity in animals, limited evidence in humans--according to guidelines for carcinogenic risk assessment (EPA, 1986b) for the in-halation route, based upon the positive animal evidence for nickel subsulfide and carbonyl compounds. However, reflecting the negative animal carcinogenicity data, the Agency has categorized nickel in Group D - inadequate evidence for the oral route of exposure.

Nickel chloride was not mutagenic, whereas nickel sulfate was found to be mutagenic in in vitro assays.

## Drinking Water Standards

There is no federal drinking water standard for nickel. EPA, however, has established a lifetime drinking water health advisory of 150 ug/L (EPA 1985c).

## PENTACHLOROPHENOL (PCP)

## Introduction

Commercial pentachlorophenol (PCP) is contaminanted with two chemicals - hexachlorobenzene (HCB), and hexachlorodibenzo-p-dioxin (HxCDD) which are currently categorized by EPA in its category B<sub>2</sub> as probable human carcinogens. Both are also potential reproductive toxins. PCP is also contaminated with polychlorinated dibenzofurans. This profile primarily addresses the toxicity of commercial PCP. The reader is referred to the profiles for HCB, HxCDD, and dibenzofurans for further information relevant to evaluating the potential toxicity of commercial PCP.

## Environmental Chemistry and Fate

The relevant physical and chemical properties for pentachlorophenol (CAS No. 87-86-5) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	266
Water Solubility (mg/L at 25°C)	14
Vapor Pressure (mmHg at 25°C)	$1.1 \times 10^{-4}$
Henry's Law Constant (atm-m³/mole)	$2.8 \times 10^{-6}$
Log K <sub>ow</sub>	5
K <sub>oc</sub>	53,000
BCF	770

Pentachlorophenol (PCP) has a moderate vater solubility, low vapor pressure, low Henry's Law Constant, and high  $K_{\rm oc}$ . Based upon its  $K_{\rm oc}$  and low vapor pressure, PCB would be strongly bound to surface soil. The  $K_{\rm oc}$  of 53,000 indicates that leaching from soils and transport to groundwater is a slow process. PCP is resistant to biodegradation. The low Henry's Law Constant and high  $K_{\rm oc}$  indicate that PCP will be strongly partitioned to surface water sediments. Finally, the BCF indicates

that, like many lipophilic organics, PCP will bioconcentrate in aquatic life.

## Noncarcinogenic Effects

PCP has elicited a wide variety of symptoms following subchronic oral administration in animals, including: secondary anemia, increased blood sugar levels, hemorrhages and congestion in the lungs and kidneys, degenerative changes in the kidney tubules, and lesions of the brain and spinal cord (EPA 1985n). Commercial PCP containing chlorinated dibenzo-p-dioxins and dibenzofurans are significantly more toxic than the purified pentachlorophenol used in subchronic animal studies.

In humans, local irritation, allergic responses, and systemic effects are found. Pentachlorophenol poisoning is characterized by profuse sweating, accompanied by fever, weight loss, and gastrointestinal distress. Occupational epidemiological studies have revealed an increased incidence of low-grade infections or inflammations, and depression of kidney functions, which are partially reversible (EPA 1985h).

## Reproduction and Development

Pentachlorophenol has not been shown to be teratogenic in any of the many animal studies designed to assess the toxicological endpoint.

Fetoxicity has been elicited by both purified and commercial PCP, with the effects probably secondary to maternal toxicity. Fetotoxic effects noted in rat studies include increases in resorptions, alterations in the sex ratio, and a number of skeletal anomalies regarded by the investigators as indicative of fetotoxicity rather than teratogenicity. EPA has developed a NOEL of 3 mg/kg/day (EPA 1987g) based on a one-generation rat study.

HxCDD, an important contaminant in commercial PCP, has elicited both fetotoxicity and teratogenicity in rat studies. Teratogenic effects observed include cleft palate, dilated renal pelvis, and abnormal vertebrae. EPA has derived a NOEL of 0.1 ug/kg/day for fetotoxicity (EPA 1987g), which is lower than the NOEL for teratogenicity.

HCB, another important contaminant of commercial PCP, has elicited fetotoxicity and teratogenicity in rodent studies. Abnormalities ob-

served in fetuses include cleft palate, reduced fetal viability, reduced neonatal weight gain, and reduced relative neonatal weight. Based on these studies, EPA set the NOEL for HCB at 1.0 mg/kg/day (EPA 1987g).

## Carcinogenicity and Mutagenicity

Pure pentachlorophenol has not been reported to be carcinogenic in a number of animal studies (EPA 1987g). It has also produced negative results in an initiation/promotion study. These results are consistent with mutagenicity studies which have primarily been negative (EPA 1987g).

However, HxCDD and HCB have both been found to be oncogenic in animal studies (EPA 1987g). The EPA estimated 95% upper bound carcinogenic potencies of  $6.2 \times 10^3$  and 1.67 mg/kg/day, for HxCDD and HCB, respectively (EPA 1986a, EPA 1987g).

## Drinking Water Standards and Criteria

EPA has issued no drinking water standards for PCP, HCB, or HxCDD. EPA has issued a proposed MCLG for PCP of 200 ug/L, based upon a DWEL of 1.01 mg/L, and assuming a drinking water contribution of 20% to total daily PCP intake (EPA 1985a).

EPA has developed health advisories for a 10 kg child and a 70 kg adult for PCP and HCB, but not for HxCDD. The EPA health advisory limits and reference concentrations for potential carcinogens for PCP and its major contaminants are summarized in the following table.

	One-day	Ten-day	Long	term	Lifetime	Reference
	10 kg	10 kg	10 kg	70 kg	70 kg	Concentration*
Pentachlorophenol	1000	300	300	1050	1050	
Hexachlorobenzene	50	50	50	175		0.02
HxCDD						
Dibenzofurans						

Source: EPA, 1986a

- No limit developed.
- \* Corresponding to a 1 x 10<sup>-6</sup> cancer risk.
  All concentrations in ug/L.

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of phenol (CAS No. 108-95-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	94
Water Solubility (mg/L at 25°C)	93,000
Vapor Pressure (mmHg at 25°C)	0.341
Henry's Law Constant (atm-m <sup>3</sup> /mole)	$4.5 \times 10^{-7}$
Log Kow	1.42
K <sub>oc</sub>	14.2
BCF	14

Phenol has a high water solubility and vapor pressure. As a consequence of these two properties, phenol can be characterized as a highly mobile chemical. For phenol released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere. Based on its low Henry's Law Constant, substantial volatilization loss should not occur to the atmosphere following release to water.

Due to its high water solubility and high vapor pressure, transport to sediments is not expected to be a major surface water fate process.

Phenol released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

According to criteria developed by Kenaga (1980), phenol with a Koc of 14.2 would be considered to be mobile in soils. Other factors which influence soil mobility include soil type, the amount of rainfall, the depth to groundwater, and the extent of degradation.

# Noncarcinogenic Effects

Phenol is a highly toxic compound that may enter the body via skin absorption, vapor inhalation, and ingestion. Based on the available human and animal data, exposure to large doses by any route of exposure can lead to serious illness or death. Toxic doses in human and species exhibit similar symptoms: initial increases in heart rate, labored breathing, cyanosis, and pulmonary edema. The present data do not indicate that phenol to be teratogenic.

# Carcinogenicity and Mutagenicity

Based upon the limited animal data, the EPA has classified phenol in category D - inadequate evidence to evaluate carcinogenicity.

The mutagenicity data are equivocal presenting on balance, equivocal evidence of mutagenicity.

# Drinking Water Standards and Criteria

EPA has not classified drinking water standards or criteria for phenol.

#### POLYCHLORINATED BIPHENYLS (PCB)

#### Introduction

Polychlorinated biphenyls (PCBs) are a class of compounds with varying degrees of chlorine substitution on two phenyl rings bound at the 1-1' position. PCBs, previously used in commerce, are mixtures of various substituted biphenyls formed by a reaction of chlorine with biphenyl. Because of their heat stability and resistance, low water solubility, and favorable dielectric properties, PCBs found considerable use in hydraulic fluids, compressor lubricants, heat transfer fluids, paints, lacquers, and ink (EPA 1987f).

PCBs have the empirical formula  $C_{12}H_{10-n}Cl_n$  with n=1 to 10. The numbering system is based upon ring-ring chlorine bonds, with identical numbering systems on each ring. By convention, the ring with the fewest chlorine substitutes, or substituted in the highest numerical positions, is designated as prime (ATSDR, 19871).

Individual PCB registered trademarks or brand names vary according to both the manufacturer and the country of origin.

PCBs, formerly produced in the United States by a single manufacturer, are called Aroclors. All Aroclors are designated by a four-digit numbering system. The first two digits denote the type of compound; the last two digits give the percentage by weight of chlorine. The only exception is Aroclor 1016. The trademarks by manufacturers in other countries include Phenoclor, Clophen, and Kaneclor.

### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fates of polychlorinated biphenyls are summarized in Table 1 (ATSDR 19871).

In water, adsorption to sediments or other organic water is a major fate process for PCBs (EPA 19871). Based on their water solubilities and octanol-water partition coefficients, the lower chlorinated components of the Aroclors will sorb less strongly than the higher chlorinated isomers.

Volatilization is also an important environmental fate process for PCBs dissolved in natural water. The estimated Henry's Law Constants

Table 1

PHYSICAL AND CHEMICAL PROPERTIES OF PCBs\*

								Henry's Law**	
Aroclor Designation	Molecular Weight (average)	Color	-	Solubility water, mg/L		Partition Coefficient Log Octanol-Water*		Constant atm-m <sup>3</sup> /mol at 25°C	Biocentration Factor***
1016	257.9	Clear	011	0.42	1.33	5.6	4 x 10 <sup>-4</sup>	2.9 x 10 <sup>-4</sup>	42,500
1221	200.7	Clear	Oil	0.59 (24°C)	1.15	4.7	$6.7 \times 10^{-3}$	$3.5 \times 10^{-3}$	
1232	232.2	Clear	Oil	Unknown	1.24	5.1	4.06 x 10 <sup>-3</sup>	Unknown	
1242	266.5	Clear	Oil	0.24	1.35	5.6	$4.06 \times 10^{-4}$	5.2 x 10 <sup>-4</sup>	
1248	299.5	Clear	Oil	0.054	1.41	6.2	$4.94 \times 10^{-4}$	2.6 x 10 <sup>-3</sup>	70,500
1254	320.4	Lt. Yellow	Viscou: liquid	0.012	1.50	6.5	7.71 x 10 <sup>-5</sup>	2.8 x 10 <sup>-3</sup>	100,000
1260	375.7	Lt. Yellow	•	0.0027	1.58	6.0	4.05 x 10 <sup>-5</sup>	$4.6 \times 10^{-3}$	190,000

<sup>\*</sup> These log Kow values represent an average value for the major components of the individual Aroclor.

Source: Unless otherwise specified, from ATSDR (19671).

<sup>\*\*</sup> Henry's Law constants were estimated by dividing the vapor pressure by the water solubilities, and represent average values for the Aroclor mixtures as a whole (ATSDR 1987r).

<sup>\*\*\*</sup> From Lyman, Reehl, and Rosenbladt (1982).

are indicative of significant volatilization from environmental waters (ATSDR 19871). However, strong adsorption to sediments significantly reduces the concentrations of PCBs available for volatilization, with longer volatilization half-lives for the higher chlorinated PCBs.

The low water solubility, high log K<sub>OW</sub>s, and demonstrated strong adsorption to soils and sediments indicate that significant leaching should not occur in soil under most conditions. Lower chlorinated PCBs will leach at rates greater than the higher chlorinated PCBs. In the presence of organic solvents, significant leaching of PCBs in soil can occur (ATSDR 19871).

PCBs with vapor pressures ranging from  $10^{-3}$  to  $10^{-5}$  mm Hg should exist almost entirely in the vapor phase in the atmosphere (Eisenreich et al, 1981). The tendency of PCBs to adsorb to particulates increases with increasing degree of chlorination. PCBs in the atmosphere are physically removed by wet and dry deposition (Eisenreich et al, 1981).

In general, the rate of degradation or transformation in the environment decreases with increasing chlorination. In the atmosphere, the vapor phase reaction of PCBs with hydroxyl radicals may be the dominant transformation process (ATSDR 19871). In the aquatic environment PCBs are not significantly degraded by hydrolysis and oxidation, and photolysis appears to be the only potentially important process (ATSDR 19871).

In general, mono-, di-, and trichlorinated biphenyls (Aroclor 1221 and 1232) biodegrade relatively rapidly; tetrachlorinated biphenyls (Aroclors 1016 and 1242) biodegrade slowly; and higher chlorinated biphenyls (Aroclors 1248, 1254 and 1260) are resistant to biodegradation (ATSDR 19871). In addition to the degree of chlorination, chlorine substitution patterns also appear to be important in influencing the rate of biodegradation.

Experimentally determined bioconcentration factors (BCFs) for various Aroclors (1016, 1248, 1254, and 1260) in aquatic species (fish, shrimp, oyster) range from 26,000 to 660,000 (Leifer et al, 1983).

#### Noncarcingenic Effects

Several complications exist in assessing the toxicity of PCBs. Different mixtures nominally depicted by PCB type and chlorine sub-

stitution may, in fact, vary significantly in isomer composition. Additionally, highly toxic contaminants are often present in PCB mixtures.

In general, however, it can be concluded that short and intermediate-term studies of toxicological effects following oral administration of PCBs to animals result in a variety of physiological and morphological alterations in the liver, including: enlargement, fatty infiltration, centrilobular lesions, and effects on liver porphyrin metabolism. The major biochemical effects include induction of mixed function oxidase enzymes and modification of porphyrin metabolism. PCBs can also inhibit the immune system. Skin applications to rabbits has been shown to cause erythema, keratosis, and chloracne.

Human studies related to PCB exposures have been done on the health of occupationally exposed workers, as well as on health effects noted following two incidents in which cooking oils contaminated with PCBs were ingested. Occupationally exposed workers typically demonstrated dermal problems such as chloracne, rashes, and burning sensations. While most biochemical parameters in these studies were found to be within normal ranges, one study reported an elevation of liver enzymes in exposed workers.

The two incidents, or outbreaks, concerning the ingestion of PCB-tainted cooking oils occurred in east Asia. The first incident, designated as the "Yusho" outbreak, occurred among Japanese (Higachi, 1976; Kurotsone and Shapiro, 1984); while the second, designated "Taichung", occurred among Taiwanese (Hsu et al, 1984; Lu and Wang, 1984). Health effects observed in humans following exposure included: chloracne, increased discharge from the eyes, soreness and weakness of limbs, headaches, dizziness, and general malaise. Because the cooking oil in the Yusho study was also found to be contaminated with highly toxic polychlorinated dibenzofurans, implications cannot be limited to PCBs alone in this study.

#### Reproduction and Development

The range of reported effects on reproduction in animals include: a lengthening of the estrus cycle, weak estrogenic activity, fetotoxicity, fetal deaths, decreased survival of the neonate, small birth weight, and

a variety of teratogenic effects. Rats and mice appear to be more resistant to reproductive toxicity than mink or monkeys, which have also been used in studies. These differences may possibly be attributable to the duration of the studies and to differences in metabolic rates and pharmacokinetics.

Most of the studies used dosages that were maternally toxic.

Maternal toxicity obviously is an important consideration when assessing reproductive and developmental toxicity. This consideration, frequently referred to as Karnofsky's rule, states that "any compound administered at the proper dosage, at the proper stage of development, or to embryos of the proper species will be effective in causing disturbances in embryonic development". This calls attention to the fact that if a pregnant animal is sick, the delicate balance between the mother and fetus is affected or disrupted, and adverse fetal effects can be expected.

There have been studies of the reproductive and developmental effects of combined exposure to PCBs subsequent to outbreaks of poisoning in Japan (Yusho) and Taiwan (Taichung). Findings in newborn children of exposed mothers include: fetal growth inhibition, low birth weight, dry brown skin pigmentation, precocious dentition, gingival hyperplasia, and abnormal calcification of the skull (DHHS 1985a).

# Carcinogenicity and Mutagenicity

There have been a number of studies designed to assess carcinogenicity in animals. All but one study have been negative. The positive study by Kimbrough et al. (1975) reported a statistically significant increase in hepatocellular carcinomas among mice and rats administered Aroclor 1260 in the diet.

Epidemiological studies have not reported significant increases in cancer in occupationally exposed workers. Explanations for these findings may include an insufficient latency period and small sample sizes in the studies.

Based upon the above evidence, EPA has classified PCBs in Group B<sub>2</sub>, with adequate evidence of carcinogenesis in animals, and inadequate evidence in humans (EPA 1985). IARC (1978) has classified PCBs in category 2B, based on studies indicating inadequate evidence for carcinogenicity

in humans, sufficient evidence in animals, and inadequate evidence of activity in short-term mutagenicity tests.

EPA's cancer assessment group has calculated a unit cancer risk of  $4.34 \, (mg/kg/day)^{-1}$ , using the upper 95 percent value of the doses used in the positive study (Kimbrough et al 1975).

#### Standards and Criteria

#### Drinking Water

As the first stage in developing a maximum contaminant level (MCL) for PCBs in drinking water, the EPA has recently proposed an MCLG of zero. EPA will establish an MCL taking into account technological feasibility of control and analytical feasibility (EPA 1988).

#### Surface Vater

The EPA has established ambient water quality criteria for the protection of freshwater and saltwater aquatic life of 0.014 ug/l and 0.03 ug/l, respectively. For human health, EPA has estimated the drinking water concentration corresponding to one-in-a-million cancer excess of 0.0079 ng/l.

# Environmental Chemistry and Fate

In general, most priority pollutant PAHs can be characterized as having low vapor pressure, low water solubility, low Henry's Law Constants, high logarithms of the octanol-water partition coefficients (log  $K_{\rm OV}$ s) and high organic carbon partition coefficients ( $K_{\rm OC}$ s). The high  $K_{\rm OC}$ s indicate that most PAHs are strongly sorbed to organic matter in the soils. This factor, combined with the low water solubilities, indicate that the rate of transport of most PAHs from the unsaturated zone via infiltration to the saturated zone will be extremely low. Low vapor pressure and low Henry's Law Constants indicate that most PAHs will not readily volatilize from surface water, and these factors, in combination with high  $K_{\rm OC}$ s, also indicate low volatilization rates from surface soils.

The exceptions to the groundwater transport argument are four PAHs (acenaphthene, fluorene, fluoranthene, and pyrene) with water solubilities greater than 100 ug/L. Although these four compounds have high  $K_{\rm oc}$ s (10 $^3$  or greater) relative to other PAHs, their solubilities indicate that they are mobile, and may be observed in groundwater. The chemical and physical properties for the 14 priority pollutant PAHs are presented in Table 1.

Typically, although PAHs are regarded as persistent in the environment, they are degradable by soil microorganisms.

Degradation rates and degree of degradation are influenced by environmental factors, microbial flora and physicochemical properties of the PAHs themselves. Important environmental factors include temperature, pH, oxygen status, soil type, moisture, and nutrient status (Sims and Overcash 1983). Microbial factors include acclimation status, populations present, and the relative proportions of bacteria, fungi, and actinomycetes (Sims and Overcash, 1983). Physico-chemical properties include chemical structure, concentration, and lipophilicity.

Compounds which are easily and rapidly biodegraded include acenaphthene, naphthalene, and phenanthrene. Compounds which are persistent, requiring long time periods or specialized conditions for degradation, include benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene,

Table 2

PHYSICAL AND CHEMICAL PROPERTIES OF SELECTED PAHS\*

Chemical Mame	Molecular Weight (g)	CAS No.	Vapor Pressure (mm Hg)	Water Solubility (mg/L)	Henry's Law Constant	log Kow	Koc (mL/g)	BCF (L/kg)
acenaphthene	154	83-32-9	1.55 x 10 <sup>-3</sup>	3.42	9.2 x 10 <sup>-5</sup>	4.0	4.6 x 10 <sup>3</sup>	242**
anthracine	178	120-12-7	1.95 x 10 <sup>-4</sup>	4.5 x 10 <sup>-2</sup>	1.2 x 10 <sup>-3</sup>	4.45	1.4 x 10 <sup>4</sup>	1,210**
benso(a)anthracene	228	56-55-3	2.2 x 10 <sup>-8</sup>	5.7 x 10 <sup>-3</sup>	1.16 x 10 <sup>-6</sup>	5.6	1.38 x 10 <sup>6</sup>	11,700**
benzo(b)fluoranthene	252	205-99-2	5.0 x 10 <sup>-7</sup>	$1.4 \times 10^{-2}$	1.19 x 10 <sup>-3</sup>	6.06	5.5 x 10 <sup>5</sup>	
benso(k)fluoranthene	252	207-08-9	5.1 x 10 <sup>-7</sup>	$4.3 \times 10^{-3}$	3.94 x 10 <sup>-3</sup>	6.06	5.5 x 10 <sup>5</sup>	
benzo(g,h,i)perylene	276	191-24-2	1.03 x 10 <sup>-10</sup>	7.0 x 10 <sup>-4</sup>	5.34 x 10 <sup>-8</sup>	6.51	1.6 x 10 <sup>6</sup>	68,200**
benzo(a)pyrene	252	50-32-8	5.6 x 10 <sup>-9</sup>	1.2 x 10 <sup>-3</sup>	1.55 x 10 <sup>-6</sup>	6.06	5.5 x 10 <sup>6</sup>	28,200**
chrysene	228	208-01-9	6.3 x 10 <sup>-4</sup>	1.8 x 10 <sup>-3</sup>	1.05 x 10 <sup>-6</sup>	5.61	2.0 x 10 <sup>5</sup>	11,700**
dibenzo(a,h)anthracene	278	53-70-3	1.0 x 10 <sup>-10</sup>	5.0 x 10 <sup>-4</sup>	7.33 x 10 <sup>-8</sup>	6.8	33 x 10 <sup>6</sup>	
fluoranthene	202	206-44-0	5.0 x 10 <sup>-6</sup>	2.6 x 10 <sup>-1</sup>	6.46 x 10 <sup>-6</sup>	4.9	3.8 x 10 <sup>4</sup>	2,920
fluorene	116	86-73-7	7.1 x 10 <sup>-4</sup>	1.69	6.42 x 10 <sup>-5</sup>	4.2	7.3 x 10 <sup>3</sup>	1,300**
indeno(1,2,3-cd)perylene	276	193-39-5	1.0 x 10 <sup>-10</sup>	5.3 x 10 <sup>-4</sup>	6.86 x 10 <sup>-8</sup>	6.5	1.6 x 10 <sup>6</sup>	
phenanthrene	178	85-01-3	6.8 x 10 <sup>-4</sup>	1.0	1.59 x 10 <sup>-4</sup>	4.46	1.44 x 10 <sup>4</sup>	2,630**
pyrene	202	129-00-3	2.5 x 10 <sup>-6</sup>	$1.32 \times 10^{-3}$	5.4 x 10 <sup>-6</sup>	4.88	3.8 x 10 <sup>4</sup>	2,800**

<sup>\*</sup> Unless otherwise footnoted, data taken from EPA (1986a).

<sup>\*\*</sup> EPA (19841)

<sup>\*\*\*</sup> Lyman, Reihl, and Rosenblatt (1982).

chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. The ease of biodegradation generally decreases with increasing molecular weight. Biodegradation products generally include hydroxylated PAH derivatives.

# Noncarcinogenic Effects

Very little attention has been paid to the noncarcinogenic effects of PAHs. It is known, however, that rapidly proliferating tissues (e.g., bone marrow, lymphoid organs, testes, etc.) appear to be the preferred targets for PAH-induced cytotoxicity.

Acute and chronic exposure to various PAHs classified as carcinogens has resulted in the destruction of specific hematopoietic and lymphoid elements, ovotoxicity, anti-spermagenic effects, adrenal necrosis, and changes in the intestinal and respiratory epithelia. This tissue damage occurs at doses expected to induce carcinogens and malignancy risks predominant in evaluating PAH toxicity. For PAHs classified as noncarcinogenic, very little is known about toxic responses or mechanisms.

# Carcinogenicity and Mutagenicity

The EPA has issued finalized carcinogenicity risk assessment guidelines (EPA, 1986b) to establish criteria for evaluating and categorizing chemicals into five groups, according to weight-of-evidence categories. According to this categorization scheme, five of the 15 priority pollutant PAHs have been placed in category B<sub>2</sub> (probable human carcinogens) with sufficient evidence of carcinogenicity in animals, and inadequate data for humans. A sixth PAH (indeno (1,2,3-cd) perylene) has been placed in category C, denoting possible human carcinogenicity based on limited evidence of carcinogenicity in animals in the absence of human data (EPA, 1986b). Table 2 contains EPA's most current categorization of priority pollutant PAHs (EPA, 1986b). Following its risk assessment guidelines, EPA typically performs quantitative risk assessments for groups B or A, and, in some cases (depending on the quality of the data), for group C.

To date, EPA has estimated a carcinogenicity slope (unit cancer risk) for carcinogenic PAHs using data for a single PAH, benzo(a)pyrene (BaP). This limited effort does not take into account the clearly docu-

Table 2

EPA CARCINOGENICITY CATEGORIZATION FOR ORAL AND INHALATION

ROUTES OF EXPOSURE FOR THE 15 PRIORITY POLLUTANTS POLYCYCLIC ARONATIC HYDROCARBONS

	EPA Carcinogenicity	Classifications
Compound	Inhalation	Oral
acenaphthene	D	D
anthracene	D	D
benso(a)anthracene	B <sub>2</sub>	B <sub>2</sub>
benso(b)fluoranthene	a <sub>2</sub>	B <sub>2</sub>
benso(k)fluoranthene	D	D
benso(g,h,i)perylene	D	D
benso(a)pyrene	8 <sub>2</sub>	B <sub>2</sub>
chrysene	8 <sub>2</sub>	B <sub>2</sub>
dibenzo(a,h)anthracene	B <sub>2</sub>	B <sub>2</sub>
fluoranthene	<b>D</b>	D
fluorene	D	D
indeno(1,2,3-cd)perylene	c	c
naphthalene	D	D
phenanthrene	D	D
pyrene	D	D

<sup>\*</sup> Unless otherwise footnoted, classification taken from EPA (1986a).

mented differences in quantitative dose-response relationships for the other PAHs. Two specialists in EPA's carcinogenic assessment group have evaluated the relative potency estimates for the other five carcinogenic PAHs to benzo(a)pyrene (Thorslund et al, 1986).

Using a series of sophisticated statistical procedures, these authors have derived estimated relative potencies for the five other "carcinogenic" PAHs relative to BaP. For the potency estimation, the authors used bioassays from individual laboratories in which BaP and the other PAHs were tested in common. The results of this procedure for developing relative potency estimates are summarized in Table 3.

RELATIVE POTENCY ESTIMATES DERIVED FOR POLICYCLIC AROMATIC HYDROCARBONS

CATEGORISED IN GROUP A, B, OR C ACCORDING TO EPA'S WEIGHT OF EVIDENCE CRITERIA

Table 3

ompound	Relative Potency Estimates
· · · · · · · · · · · · · · · · · · ·	
penzo(a)pyrene	1
benzo(a)anthracene	0.145
enso(b)fluoranthene	0.140
hrysene	0.0044
dibenzo(a,h)anthracene	2.82
indeno(1,2,3-cd)perylene	0.232

Source: Thorslund et. al. (1986)

#### TETRACHLOROETHENE (PERCHOLOROETHYLENE OR PERC)

#### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of tetrachloroethene (CAS No. 127-18-4) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	166
Water Solubility (mg/L at 25°C)	150
Vapor Pressure (mmHg at 25°C)	17.8
Henry's Law Constant (atm-m³/mole)	$2.6 \times 10^{-2}$
Log Kow	2.6
	2.0
K <sub>oc</sub>	364

Tetrachloroethene's moderate water solubility and vapor pressure indicate that volatilization is the major loss mechanism from surface soil and surface water. Its moderate  $K_{\rm oc}$  indicates that leaching to groundwater from lower soil depths is an important mechanism. In addition, tetrachloroethene is biodegraded by certain soil microorganisms by a sequential series of monodechlorinations. Once it reaches the groundwater, its moderate  $K_{\rm oc}$  indicates that tetrachloroethene will be moderately absorbed to soil particles and will be moderately retarded relative to groundwater transport. Finally, tetrachloroethene is subject to low bioconcentration in aquatic species.

#### Noncarcinogenic Effects

The principal toxic effects following acute exposure in animals to tetrachloroethene (PERC) are depression of the CNS, ataxia (failure of muscular coordination), and respiratory cardiac arrest (ATSDR 1987m, EPA 1985f). Subchronic and chronic effects in animals include damage to the

liver and kidneys. In humans, the principal effects are CNS depression and liver toxicity.

# Carcinogenicity and Mutagenicity

A 1977 NCI bioassay in which PERC was administered by gavage reported increased incidence of liver tumors in mice but not rats (EPA 1985d). A draft report of a NTP inhalation bioassay, currently under internal review, has noted an increased incidence of tumors in mice and rats. Although EPA has previously categorized tetrachloroethylene in Group B<sub>2</sub>--probable human carcinogen (EPA 1985b, 1985h)--the Agency is awaiting final results of the NTP bioassay before commencing a rule-making for the chemical in drinking water.

PERC has been evaluated for its ability to cause gene mutation, chromosomal aberrations, unscheduled DNA synthesis, and mitotic recombination. In general, these responses have been weak and were observed at high concentrations that were cytotoxic (EPA 1985h). Additionally, no dose-dependent relationships were demonstrated in these studies (EPA 1985h).

#### Drinking Water Standards

EPA has not established an MCL for PERC in drinking water. The agency is scheduled to begin rule-making procedures to establish an MCL in the near future.

#### TOLUENE

# Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of toluene (CAS No. 108-88-3) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	92
Water Solubility (mg/L at 25°C)	535
Vapor Pressure (mmHg at 25°C)	28.1
Henry's Law Constant (atm-m³/mole)	$6.4 \times 10^{-3}$
Log Kov	2.73
K <sub>oc</sub>	300
BCF	10.7

Toluene has a high water solubility, moderate vapor pressure, high Henry's Law Constant, and moderate  $K_{\rm oc}$ . Based on the vapor pressure and  $K_{\rm oc}$ , volatilization from surface soils is an important transport pathway. Based on the water solubility and moderate  $K_{\rm oc}$ , toluene will be readily transported to groundwater, and upon reaching groundwater, be subject to a low degree of retardation relative to the groundwater flow. Based on the water solubility and high Henry's Law Constant, volatilization will be a major transport pathway from surface water.

#### Noncarcinogenic Effects

Acute or chronic exposure to high levels of toluene in animals results in CNS depression and effects on the lungs, liver, and kidney.

EPA has derived an AADI for drinking water consumption based upon a 24-month inhalation study in rats (EPA 1985c). Based upon a NOAEL of 1,130 mg/m<sup>3</sup>, an uncertainty factor of 100, and assuming 50 percent pulmonary absorption, EPA derived an AADI of 10,100 ug/L (EPA 1985c).

# Carcinogenicity and Mutagenicity

Only one long-term carcinogenicity bioassay of toluene has been reported. This study concluded that toluene was not carcinogenic following inhalation in rats. NTP is conducting carcinogenicity studies in which toluene is being administered by inhalation and gavage to rats and mice. In addition, carcinogenicity studies by European investigators are expected to be published in the next few years. According to weight-of-evidence carcinogenicity criteria, EPA has classified toluene in Category D, not classifiable as to human carcinogenicity (EPA 1985c).

Toluene has not been shown to be mutagenic in in vivo or in vitro assays (EPA 1985c).

#### Drinking Water Standards and Criteria

Standards. In the first stage of the rule-making process designed to establish a MCL for toluene in drinking water, EPA has issued a proposed MCLG of 2,600 ug/L derived from the AADI of 10,100 ug/L by allocating a 20 percent of drinking water contribution to total intake from all sources of exposure (EPA 1985c). Subsequent to finalization of the MCLG, EPA will evaluate analytical feasibility and feasibility of control in establishing an enforceable MCL.

Criteria. In the absence of adequate dose-response data for oral exposure to toluene, EPA derived a 1-day HA, based on NOAEL of 377 mg/m<sup>3</sup> reported in studies of humans, the subjects of single inhalation exposures of up to 8 hours. Based upon the NOAEL, an uncertainty factor of 100, and a variety of physiological parameters and intake assumptions, EPA derived 1-day HAs of 18,000 ug/L and 63,000 ug/L for a 10-kg child and 70-kg adult, respectively (EPA 1985d).

In the absence of sufficient data, EPA derived 10-day HAs of 6,000 ug/L (child) and 21,000 ug/L (adult), by applying an uncertainty factor of 3 to the 1-day HA. The Agency utilized a three-fold rather than the usual 10-fold uncertainty factor because toluene is rapidly distributed and excreted, and because the chemical presents little bioaccumulation potential relative to typical toxicants (EPA 1985d).

The EPA ambient water quality criterion for the protection of human health is 14,300 ug/L (EPA 1980a).

#### 1,1,1-TRICHLOROETHANE (TCA)

#### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,1,1-trichloroethane (CAS No. 71-55-6) are summarized below. (EPA 1986a).

Molecular Weight (g/mole)	133
Water Solubility (mg/L at 25°C)	1,500
Vapor Pressure (mmHg at 25°C)	123
Henry's Law Constant (atm-m³/mole)	$1.4 \times 10^{-2}$
Log K <sub>ov</sub>	2.5
K <sub>oc</sub>	152
BCF	5.6

1,1,1-trichloroethane (TCA) can be characterized as having a high water solubility, a high vapor pressure, a high Henry's Law Constant, and a moderate  $K_{\rm oc}$ . The high vapor pressure and moderate  $K_{\rm oc}$  indicate that volatilization will be a major transport pathway in surfical soil. In subsurface soils, the high water solubility and moderate  $K_{\rm oc}$  indicate that transport to groundwater represents a major pathway, and once the water table is reached, chemical transport will be moderately retarded relative to the groundwater flow. The high vapor pressure, high Henry's Law Constant, and high water solubility indicate that volatilization from surface water will be a major transport pathway.

# Noncarcinogenic Effects

The principal noncarcinogenic effects of 1,1,1-trichloroethane (TCA) following exposure in animals and man are depression of the CNS, increase in liver weight, and cardiovascular changes. Current data do not suggest that TCA is a reproductive or developmental toxin.

EPA has developed a risk reference dose (RRfD) of 0.35 mg/kg/day based upon a NOAEL of 1,365 mg/m<sup>3</sup> reported in a study in which mice were exposed by inhalation for 14 weeks. EPA derived the RRfD by application of an uncertainty factor of 100, a 30% absorbed dose, and standard physiological parameters (EPA 1985g).

# Carcinogenicity and Mutagenicity

There have been two TCA carcinogenicity bioassays. The first, conducted by NCI, was judged to be inadequate due to poor survival in treated animals. Preliminary results of the second, by NTP, showed elevated incidences of hepatocellular carcinomas. These initial results have been questioned and the study is currently being audited (EPA 1985b). Based upon these results, EPA has classified TCA according to weight-of-evidence criteria in Group D, not classifiable--inadequate human and animal evidence of carcinogenicity (EPA 1987a).

#### Drinking Vater Standards and Criteria

Standards. EPA has established a drinking water MCL for TCA of 200 ug/L.

Criteria. EPA has developed a 1-day HA based upon a LOEL of 1.4 g/kg/day reported in a study of rats receiving a single oral dose of TCA. Based upon the LOEL, and standard weight and intake assumptions, EPA derived a 1-day HA of 14,000 ug/L for a 10-kg child (EPA 1984d). In the absence of sufficient data, EPA has not developed a 10-day HA. EPA has developed longer-term HAs of 35,000 ug/L (child) and 125,000 ug/L (adult), based upon a NOAEL of 0.5 g/kg/day reported in a study in rats receiving TCA by gavage for 12 weeks (EPA 1985d).

The EPA lifetime HA of 200 ug/L is equivalent to and was derived by the same methodology as the RMCL (EPA 1985d).

The EPA ambient water quality criterion for TCA for the protection of human health is 18,700 ug/L (EPA 1980a).

#### TRICHLOROETHENE (TCE)

# Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of trichloroethene (TCE) (CAS No. 79-01-6) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	131
Water Solubility (mg/L at 25°C)	1,100
Vapor Pressure (mmHg at 25°C)	57.9
Henry's Law Constant (atm-m³/mole)	$9.1 \times 10^{-3}$
Log Kow	2.38
K <sub>oc</sub>	126
BCF	10.6

The high water solubility and high vapor pressure of TCE indicate that volatilization will be the predominant loss mechanism from surficial soils. In soils and groundwater, trichloroethene is degraded to cis and trans 1,2-dichloroethylene, vinylidene chloride, and vinyl chloride (ATSDR 1987n). TCEs moderate organic-carbon partition coefficient indicates it is moderately adsorbed to soils, and will leach to groundwater. In light of its moderate Henry's Law Constant, volatilization will be the major fate process for TCE from surface water.

Trichloroethene is only moderately bioconcentrated in aquatic life.

#### Noncarcinogenic Effects

The principal toxicological effect of concern for trichloroethene (TCE) is carcinogenicity. Noncarcinogenic effects include CNS disturbances and kidney and liver damage following exposure to relatively high airborne concentrations (ATSDR 1987n).

# Carcinogenicity and Mutagenicity

Six studies of the carcinogenicity of TCE in animals have been published. Two have reported significant increases in liver tumors in mice. EPA has judged three others as technically flaved. A sixth reported that TCE, containing epichlorohydrin and epoxybutane, was carcinogenic in a less responsive mouse strain, but pure TCE was not (EPA 1985b). Recognizing the lower responsiveness of the mice in the latter study, EPA has classified TCE based upon weight-of-evidence carcinogenicity guidelines in Category B2--probable human carcinogen (EPA 1987a).

Commercial TCE containing stabilizers has been reported to be weakly mutagenic in a variety of in vitro and in vivo assays representing a wide evolutionary range of organisms (EPA 1985g). Based on these data, EPA has concluded that commercial TCE may have the potential to cause weak or borderline increases above the spontaneous level of mutagenic effects in exposed human tissues (EPA 1985g).

# Drinking Water Standards

EPA has established a drinking water MCL for TCE of 5 ug/1 (EPA 1987a).

#### 2,4,6-TRICHLOROPHENOL (TCP)

# Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 2,4,6-trichlorophenol (CAS No. 88-06-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	197
Water Solubility (mg/L at 25°C)	800
Vapor Pressure (mmHg at 25°C)	$1.2 \times 10^{-2}$
Henry's Law Constant (atm-m / mole)	$3.9 \times 10^{-6}$
Log Kov	3.87
K <sub>oc</sub>	2000
BCF	150

Based upon its high  $K_{\rm OC}$  and low vapor pressure, volatilization is not an important fate mechanism for TCP from surface soil. Reportedly, TCP is subject to some degradation. In light of the low vapor pressure and high  $K_{\rm OC}$ , degradation may be an important fate mechanism in soils. The high  $K_{\rm OC}$  indicates that TCP is only slowly leached and transported to groundwater. Should it reach groundwater, TCP will be strongly absorbed to soil organic carbon, and will be strongly retarded relative to groundwater flow.

In surface water, sorption to sediment appears to be the most important fate mechanism. In addition, based on its BCF, TCP is subject to moderate bioconcentration in aquatic life.

## Noncarcinogenic Effects

In preliminary subchronic feeding studies, single strains of mice and rats received TCP ad <u>libitum</u> in the diet for seven weeks. Observations extended one week following cessation of the diet. A significant reduction in growth rate was observed in rats receiving 10,000

ug/g and mice receiving 14,700 ug/g. Assuming that rats weighed 0.4 kg and consumed 0.02 kg/day, NAS estimated a minimum toxic dose of 500 mg/kg/day (NAS 1982).

# Carcinogenicity and Mutagenicity

Technical grade TCP was administered in the diet to male and female F344 rats and male  $B_6C_3F_1$  mice at concentrations of 5,000 ug/g and 10,000 ug/g, respectively, for 105 to 107 weeks (NCI 1979 as cited in NAS 1982). Female  $B_6C_3F_1$  mice received TCP at 10,000 ug/g to 20,000 ug/g, but at 38 weeks, the doses were reduced by a factor of 4 because of reduced weight gain. Under the conditions of the experiment, TCP was reported to be carcinogenic in male F344 rats (lymphomas or leukemias) and  $B_6C_3F_1$  mice (hepatocellular carcinomas or adenomas) (NAS 1982). Polychlorinated dibenzofurans and dioxins may be formed during the chemical synthesis of TCP. The dioxin content of the technical grade TCP used in these studies was not reported.

Based upon the positive animal studies, EPA has categorized TCP as a B<sub>2</sub>, probable human carcinogen (EPA 1986a).

TCP was not reported as mutagenic in the Ames assay with or without activation by hepatic microsomes (EPA 1984c). TCP did increase the mutation rate but not the intragenic recombination in <u>S. cervisiac</u> (EPA 1984c).

#### Drinking Water Standards and Criteria

EPA has not developed drinking water standards or health advisories for TCP. EPA has established ambient water quality criteria (AWQC), based upon TCPs carcinogenicity in animals, for the protection of human health. The AWQC criteria are 1.2 ug/L for water and fish consumption, and 3.6 ug/L for fish consumption only. These criteria are equivalent to the estimated incremental increased 1 x  $10^{-6}$  lifetime cancer risk, based upon the animal carcinogenicity study results (EPA 1986g).

# APPENDIX F

# TOXICITY PROFILES FOR SELECTED CONTAMINANTS OF CONCERN

# Environmental Chemistry and Fate

Arsenic may be released to the atmosphere as a gas or vapor; or absorbed to particulate matter and transported to other media by dry or wet deposition (ATSDR 1987a). Because trivalent arsenic may undergo oxidation in the air, atmospheric arsenic is usually a mixture of trivalent and pentavalent forms. Most airborne arsenic is usually adsorbed on small diameter particulate matter. Photolysis is not considered to be an important fate process for arsenic.

Arsenic in surface water can undergo a complex pattern of transformations: oxidation-reduction, ligand exchange, biotransformation, and precipitation and adsorption (Callahan 1979). As a consequence of these reactions, arsenic is extremely mobile in aquatic systems, and riverborne arsenic is capable of being transported great distances. Factors most strongly influencing the rates of these reactions include: Eh, Ph, metal sulfide and sulfide ion concentrations, iron concentration, presence of phosphorus minerals, temperature, salinity, and distribution and composition of biota (Callahan 1979).

Sorption onto clays, iron oxides, manganese compounds, and organic matter is an important fate in surface water, with sediment serving as a reservoir for most of the arsenic entering surface water. Sediment-bound trivalent and pentavalent arsenic, methylated by aerobic and anaerobic microorganisms, may be released back into the water column.

Soluble forms of arsenic adsorb to soil and travel with the soil matter with which they are associated. Shifts in oxidation state may occur in either direction, depending on the particular characteristics of the soil and groundwater. Volatilization of methylated arsenics from groundwater is possible.

Arsenic in soil is predominantly found in an insoluble, adsorbed form. Clay with high anion-exchange capacity strongly adsorbs pentavalent arsenic. Other important adsorption processes include complexation and chelation by organic material, iron, or calcium. Leaching of arsenic is usually important in the top 30 centimeters of soil, but may also be important at greater depth in sandy soils. Arsenate predominates in aerobic soils; arsenite in slightly reduced soils; arsine,

methylated arsenicals and elemental arsenics in very reduced conditions (e.g., swamps and bogs)(ATSDR 1987a).

As noted above, microorganisms may reduce and methylate arsenicals in water and soil, resulting in volatilization and emission to the air. The volatilization rate is heavily dependent on whether soil is oxygenated or anaerobic, the pH, and the microbe types and concentrations in soils.

In aquatic systems, bioconcentration of arsenic primarily occurs in algae and lower invertebrates, but biomagnification does not appear to be significant (Callahan 1979).

Plants may accumulate arsenic via root uptake, with uptake being dependent on the species, soil arsenic concentration, and soil characteristics.

# Noncarcinogenic Effects

At high doses, arsenic compounds have been shown to produce acute and chronic toxic effects including irreversible systemic damage. The trivalent compounds are the most toxic and tend to accumulate in the body. Animal studies have shown that chronic arsenic exposure may cause body weight changes, decreased blood hemoglobin, liver damage, and kidney damage.

There is evidence that arsenic is an essential element enchancing growth and development in certain animal species, and it has been suggested that arsenic may be an essential element for humans (NAS 1980). Whether or not arsenic is an essential element is the subject of continuing research.

Teratogenic effects of arsenic compounds at relatively high exposure levels have been demonstrated in a number of animal species (EPA 1984f, ATSDR 1987a). Generally, these effects have been observed following parenteral (injection) administration; whereas, administration at lower doses by the more relevant oral route has not resulted in any significant reproductive or developmental effects.

# Mutagenicity and Carcinogenicity

Arsenic has been shown to be mutagenic in several assay systems and to induce chromosomal aberrations in vivo and in vitro. Animal carcino-

genicity studies have reported conflicting results. Several studies have reported an increased incidence of bronchogenic carcinomas in rats exposed intratracheally to an arsenic-containing pesticide. Reasons for inconsistent carcinogenicity findings in animals may include inappropriate selection of an animal model, and use of flaved study designs. In humans, epidemiologic studies and case reports have reported that arsenic is associated with tumors of the skin, lungs, genital organs, and visual organs (EPA 1984f, EPA 1985c, ATSDR 1987a).

EPA has classified arsenic in Group A, i.e., a human carcinogen, based on extensive evidence of human carcinogenicity through inhalation and ingestion exposure (EPA 1985c).

#### Drinking Water Standards and Criteria

Standards. The current MCL for arsenic under the National Interim Drinking Water Regulations is 50 ug/L. The NAS Drinking Water Committee has analyzed the toxicology of arsenic (NAS 1983a). Based upon this evaluation, NAS recommended the retention of the MCL pending resolution of the question whether arsenic is an essential element in the human diet.

NAS also examined the available epidemiologic studies which were designed to investigate the relationship between arsenic exposure and skin cancer in the United States. The conclusion of the report was that these studies lacked statistical power to determine if arsenic causes skin cancer. However, the report stated that precursors of skin cancer, normally seen in cases of arsenic-induced skin cancer, were not seen in these studies.

Consistent with the NAS recommendations, EPA has proposed that the MCLG remain at the current MCL of 50 ug/L. In its determination, EPA stated that the MCL was below concentrations at which noncarcinogenic toxicity had been demonstrated and was within the concentration range which might be, based on further investigation, essential for humans (EPA 1985c).

<u>Criteria</u>. Based upon recommendations of NAS, EPA has proposed that all health advisories for arsenic be set at 50 ug/L (EPA 1985d). The EPA ambient water quality criterion for the protection of human health

is 22 ug/L, corresponding to  $1 \times 10^{-5}$  lifetime excess cancer risk calculated on the basis of an epidemiological study of skin cancer among Taiwanese exposed via drinking water (EPA 1980a).

#### BENZENE

#### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of benzene (CAS No. 71-43-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	78
Water Solubility (mg/L at 25°C)	1,750
Vapor Pressure (mmHg at 25°C)	95.2
Henry's Law Constant (atm-m³/mole)	5.6 x 10 <sup>-3</sup>
Log Kov	2.12
Koc	83
BCF	5.2

Benzene has a high water solubility and vapor pressure. As a consequence of these two properties, benzene can be characterized as a highly mobile chemical. For benzene released to air, some rainvater vashout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere. Based on its high Henry's Law Constant, volatilization will result in substantial loss to the atmosphere following release to water.

Due to its high water solubility and high vapor pressure, transport to sediments is not expected to be major surface water fate process.

Benzene released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

According to criteria developed by Kenaga (1980), benzene with a  $K_{\rm OC}$  of 83 would be considered to be mobile in soils. Other factors

which influence soil mobility include soil type, the amount of rainfall, the depth to groundwater, and the extent of degradation (ATSDR 1987b).

Benzene is rapidly degraded in the atmosphere via reaction with the hydroxy radical. In soils and waters, biodegradation is an important process.

#### Noncarcinogenic Effects

The best known and longest recognized toxic effect of benzene in humans is depression of bone marrow function. Benzene-exposed individuals have been found to display anemia, leucopenia, and/or thrombocytopenia (EPA 1985c, ATSDR 1987b). When simultaneous depression of all three cell types (pancytopenia) is accompanied by bone marrow necrosis, the syndrome is called aplastic anemia.

# Carcinogenicity and Mutagenicity

Excess leukemia mortality, particularly acute myelogenous and monocytic leukemia, has been demonstrated among humans occupationally exposed to benzene. In addition to this definitive human evidence, several long-term bioassays have demonstrated increased incidences of tumors and leukemia following administration in animals. Based primarily upon the direct evidence in man, EPA has classified benzene according to weight-of-evidence carcinogenicity criteria in Group A, human carcinogen-sufficient evidence from epidemiological studies (EPA 1987a).

Benzene has been tested extensively for genotoxic properties.

Benzene was not mutagenic in several bacterial and yeast systems.

Equivocal results have been reported for clastogenic results in vitro; several investigators have reported positive results in mouse micronucleus assays, as well as studies of chromosomal observations in rabbits.

Many investigators have reported significant increases in chromosomal aberrations in symptomatic and asymptomatic workers with either a current or past history of exposure to benzeue.

# Drinking Water Standards

EPA has established a final drinking water MCL of 5 ug/L (EPA 1987a).

## Environmental Chemistry and Fate

The primary sources of atmospheric cadmium are combustion of coal and petroleum products. Cadmium from these sources is primarily adsorbed on small, highly respirable particles, which can be transported over large distances and transferred to other environmental compartments via wet deposition. Cadmium adsorbed to small particulates is more persistant than that adorbed to larger particulates. Photochemical reactions are apparently not involved in the environmental fate of cadmium (ATSDR, 1987h).

Relative to other metals, cadmium is mobile in surface water. In natural waters, cadmium exists as a hydrated ion, metal-inorganic complexes with carbonate hydroxyl, chlorine or sulfate anions; or as metal-organic complexes with humic acids (ATSDR, 1987h).

Because it exists only as the divalent cation, aqueous cadmium is not strongly influenced by the redox potential of water. However, under reducing conditions forming sulfide, cadmium will precipitate in sediments as cadmium sulfide. The concentration of aqueous cadmium is usually inversely related to the pH value and the amount of organic material present (ATSDR 1987h). Humic acid substances account for most of the organic complexes, with solubility dependant on the nature of the humic substance. Sorption by clays and iron oxides is important in reducing aquatic cadmium concentrations.

Cadmium concentrations are typically low in groundwater due to several factors. These factors include sorption by mineral matter and clay, binding to humic substances, precipitation as cadmium sulfide in the presence of sulfide, and precipitation as cadmium carbonate at high pHs.

In soil, cadmium may occur as free cadmium compounds or as the divalent ion dissolved in soil. As a consequence of cation exchange, cadmium may be bound to soil minerals or organic constituents. The aerobic nature of topsoils tends to reduce the amount of cadmium bound to sulfide. High soil acidity favors release of the divalent cadmium cation and its uptake by plants.

Cadmium is not reduced or methylated by microorganisms. However, the biological production of sulfide results in cadmium precipitation. Cadmium is strongly accumulated by all organisms, with concentrations in freshwater and marine organisms hundreds to thousands of times higher than in water being typical. Bioaccumulation of cadmium is strongly correlated with soil cation-exchange capacity (CEC), decreasing with increasing CEC. Bioconcentration in aquatic life is greatest for bottom feeders (e.g. mollusks and crustaceons), followed by fish and aquatic plants (ATSDR, 1987h). Bioaccumulation due to the use of cadmium-containing pesticides on food crops has been noted in beef and poultry.

#### Noncarcinogenic Effects

Acute and chronic exposure to cadmium in animals and humans results in renal dysfunction, hypertension, anemia, and altered liver microsomal activity. The kidney is considered to be the critical target organ in humans chronically exposed to cadmium by ingestion. The early clinical signs of renal injury include proteinuria, glucosuria, and amino-aciduria.

To calculate a drinking water equivalent level (DWEL), EPA used renal dysfunction as an endpoint, and the most widely accepted estimate for the critical (threshold) concentration of cadmium in the renal cortex--200 ug/g. Using a 4.5% absorption of the daily dose and 0.01% excretion in the total body burden per day, EPA calculated an LOAEL of 352 ug/day for renal effects in humans. Incorporating an uncertainty factor of 10, EPA has developed an RfD of 35 ug/day. Adjusting the RfD for consumption of 2 liters of water per day, EPA has derived a provisional DWEL of 18 ug/L (EPA 1985c).

Embryotoxic and teratogenic effects have been demonstrated in many mammalian species following parenteral administration of high doses of cadmium. In contrast, there is little evidence of these effects at lower doses by either of the more relevant inhalation or oral exposure routes (EPA 1981, ATSDR 1987h).

#### Carcinogenicity and Mutagenicity

Cadmium chloride aerosol administered by inhalation for 18 months produced lung tumors in rats. In contrast, all cancer bioassays in

which cadmium has been administered orally have been negative. Recent epidemiological studies indicated that workers chronically exposed to cadmium are at risk of elevated lung cancer mortality. According to its weight-of-evidence carcinogenicity criteria, EPA has classified cadmium in Group B1 (probable human carcinogen) for inhalation based on the epidemiological data (EPA 1986a).

While the Agency has concluded that cadmium is a carcinogen by the inhalation route, EPA has classified the chemical in Group D, inadequate evidence for carcinogenicity for the oral route of exposure, because of the negative results reported for cancer bioassays in which cadmium was administered orally (EPA 1986a). Consistent with this categorization, EPA has proposed that the MCL for cadmium be set based upon noncarcinogenic toxicological endpoints.

## Drinking Water Standards

The current MCL for cadmium, under the National Interim Primary Drinking Water Regulations, is 10 ug/L. This level was designed to prevent renal dysfunction, and was based on a critical value of cadmium in the kidney cortex of 200 ug/g, and assumptions on gastrointestinal absorption, excretion of the absorbed dose, daily excretion of the total body burden, and daily dietary cadmium intakes. The World Health Organization (WHO) guideline for drinking water is 5 ug/L. This value was based on a value for provisional tolerable weekly cadmium intake, assuming that 25% of the total cadmium intake was attributable to drinking water. EPA has proposed an MCLG of 5 ug/L based upon the WHO guidelines and the NAS SNARL (EPA 1985c).

#### CHLOROBENZENE

# Environmental Chemistry and Pate

The relevant physical and chemical properties and environmental fate of chlorobenzene (CAS No. 108-90-7) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	113		
Water Solubility (mg/L at 25°C)	466		
Vapor Pressure (mmHg at 25°C)	11.7		
Henry's Law Constant (atm-m³/mole)	$3.7 \times 10^{-3}$		
Log Kov	2.84		
K <sub>oc</sub>	330		
BCF	10		

Chlorobenzene's moderate water solubility, vapor pressure, and Henry's Law Constant indicate that volatilization from surficial soils and surface water is a major transport pathway.

Once adsorbed on soil, the moderate solubility and  $K_{\rm oc}$  (330) indicate that chlorobenzene will leach and be transported to groundwater. The degree and rate of leaching will depend on a variety of factors including the soil type, organic carbon content, and the presence of organic solvents in the soil. Once chlorobenzene reaches the groundwater, the  $K_{\rm oc}$  indicates that retardation relative to the groundwater flow will occur due to partitioning and adsorption to soil particles.

Current data indicate that degradation of chlorobenzene in aquatic systems is slow (EPA 1985). The estimated BCF of 10 indicates that monochlorobenzene is only slightly bioconcentrated in aquatic life.

#### Noncarcinogenic Effects

Chlorobenzene exerts its toxicity primarily on the central nervous system, liver, and kidney. Liver effects include necrosis and interference with porphyrin metabolism. Kidney effects include swelling of the tubular and glomerular epithelia. Hematopoietic effects (e.g., lymphocytosis and leukopenia) have been reported among chlorobenzene-exposed workers; however, it is uncertain whether these effects can be attributed to chlorobenzene or to other contaminants (EPA 1985g).

# Carcinogenicity and Mutagenicity

In a single National Toxicology Program (NTP) bioassay, chlorobenzene was found not to be carcinogenic in mice and rats. The NTP report did note that chlorobenzene induced a statistically significant increased incidence of neoplastic nodules in rates exposed to the highest dose. On this basis, EPA classified chlorobenzene according to weight-of-evidence carcinogenicity criteria in Group C -- limited evidence in animals, no evidence in humans (EPA 1985g).

Most mutagenicity assays of chlorobenzene in bacteria, fungal, and mammalian tissue cultures have been negative (EPA 1985h). One study, however, in <u>Streptomyces antibioticus</u> reported that chlorobenzene induced reversion to vitamin B1 prototrophy, and one study in Saccharomyces cerevisiae showed increased mitotic crossing (EPA 1985k).

#### Drinking Water Standards and Criteria

Standards. EPA has not established an MCL or MCLG for chlorobenzene in drinking water.

Criteria. In the absence of suitable data, EPA has not derived a 1-day HA for chlorobenzene. EPA has, however, developed 10-day, longerterm, and lifetime HAs by application of 100-fold uncertainty factors and various intake assumptions and physiological parameters to NOAELs reported in animal studies (EPA 1985g). The 10-day advisory of 1,800 ug/L for a 10-kg child was derived from a NOAEL of 345 mg/m<sup>3</sup> reported in an inhalation teratology study in rats and rabbits; the longer-term HAs of 9,000 ug/L (child) and 30,000 ug/L (adult) were derived using a NOAEL of 125 mg/kg/day reported in a subchronic gavage study in mice and rats.

The lifetime HA of 600 ug/L was derived from the NOAEL used in the derivation of the longer-term HA, using an additional uncertainty factor of 10 and assuming that drinking water comprises 20% of the total daily intake.

NAS has estimated, based upon the draft NTP, that a drinking water concentration of 2.3 ug/L would correspond to an estimated one-in-a-million incremental excess lifetime cancer risk (NAS 1983).

EPA has developed an ambient water quality criterion for the protection of human health of 488 ug/L and for organoleptic (odor and taste) effects of 20 ug/L (EPA 1980a).

#### 4-METHYL-2-PENTANONE

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 4-methyl-2-pentanone are summarized below (Verscheuren 1983).

Molecular Weight (g/mole)	100
Water Solubility (mg/L at 25°C)	19,000
Vapor Pressure (mmHg at 25°C)	6 (20°C)
Henry's Law Constant (atm-m³/mole)	no data found
Log K <sub>ow</sub>	no data found
K <sub>oc</sub>	no data found
BCF	no data found

4-methyl-2-pentanone (MIBK) has a high water solubility and moderate vapor pressure. As a consequence of these two properties, benzene can be characterized as a moderately mobile chemical. For MIBK released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere.

Due to its high water solubility and moderate vapor pressure, some transport to sediments is expected.

MIBK released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil whereas the latter pathway predominates at lower soil depths.

# Noncarcinogenic Effects

In high concentrations, MIBK produces narcosis with symptoms of headache, nausea, lightheadedness, and vomiting.

# Carcinogenicity and Mutagenicity

MIBK has not been tested in a long-term animal carcinogenesis bio-assay. Consequently MIBK would be categorized according to EPA carcinogenic risk criteria in group D - insufficient data, MIBK has not been shown to be mutagenic.

## Standards and Criteria

There are no EPA drinking water standards, health advisories or ambient water quality criteria for the protection of human health for MIBK.

EPA has concluded that all of the above effects point toward a generalized impairment of normal physiological functioning of several different organ systems as adult PbB levels exceed 30 to 40 ug/dl. Evidence of impaired heme synthesis effects in blood occur at even lower levels.

More recent research has indicated that there is a relationship between PbB levels and increases in blood pressure. Preliminary review of this work indicates a statistically significant correlation between PbB levels and diastolic blood pressure in white males, ages 40 to 50, with no threshold apparent in the range of 6 to 30 ug/dl. Of particular concern is the finding of a 2 mm Hg increase in diastolic pressure per incremental PbB level increase of 0.5 ug/dl. Possible increases in risk of more severe medical events (stroke, heart attack, death) associated with lead-induced increases in blood pressure are also estimated in one of the recently published studies.

Children represent a sensitive subpopulation with regard to lead toxicity. As with adults, lead affects many different ogan systems and biochemical/physiological processes across a wide range of exposure levels. Effective PbB levels for producing encephalopathy or death in children are lower than in adults, starting at approximately 80 to 100 ug/dl. Permanent metal retardation and other marked neurological deficits are among lasting neurological sequelae typically seen in cases of nonfatal childhood lead encephalopathy. Other overt neurological signs and symptoms of subencepthalopathic lead intoxication, such as peripheral neuropathies (functional and/or pathological changes in the peripheral nervous system), have been detected in some children at PbB levels as low as 40 to 60 ug/dl. Chronic kidney disease is not evident at PbB levels above 100 ug/dl. Moreover, colic and other overt gastrointestinal symptoms occur in children, at least down to 60 ug/dl. anemia is also evident at 70 ug/dl, representing an extreme manifestation of reduced hemoglobin synthesis at PbB levels as low as 40 ug/dl. All these effects are widely accepted as adverse health effects, and are reflective of widespread marked impact of lead on the normal physiological functioning of many different organ systems (EPA 1984d, 1985c, ATSDR 19871).

Additional studies demonstrate further important health effects occurring in non-overtly lead-intoxicated children at similar or lower PbB levels than those indicated above. Among the most important and controversial of these electrophysiological and neuropsychlological effects are indications of peripheral nerve dysfunction, indexed by slowed nerve conduction velocities (NCV) found in children with PbB levels lower than 30 ug/dl. EPA has concluded that while none of these studies on CNS effects can individually be regarded as conclusively proving significant cognitive (IQ) or behavioral effects occurring below 30 ug/dl, they clearly indicate likely assoications between neuropsychologic deficits and PbB levels as low as 30 to 50 ug/dl. The magnitude of average observed IQ deficits is approximately 5 points at mean PbB levels of 50 to 70 ug/dl and about 4 points at mean levels of 30 to 50 ug/dl. Whether a smaller risk exists at somewhat lower levels (15 to 30 ug/dl) cannot be determined at this time (EPA 1984d, 1985c).

Many different impacts (representing potentially impaired functioning and depleted reserve capacities of many different tissues and organs) have been noted at PbB levels below 30 ug/dl.

At PbB levels around 10 to 15 ug/dl, initial signs of detectable heme synthesis impairment occur in many different organic systems, indications of increasing degrees of pyrimidine metabolism interference, signs of altered nervous system activity, and interference in vitamin-D metabolism. EPA has stated that, on the basis of these data, these effects might be viewed as becoming sufficiently adverse to warrant avoidance as PbB levels exceed 20 to 25 ug/dl (EPA 1985c).

#### Reproduction and Development

There is a paucity of data on which to evaluate the effects of lead on reproduction and development in humans. Early studies of pregnant women exposed to high levels of lead indicated toxic, but not teratogenic, effects on the conceptus. One recently reported study hints at birth anomalies possibly associated with exposure to low lead levels (mean cord blood level of 15 ug/dl) among women in the general population. However, the significance of these studies has been questioned because of the absence of reported statistically significant associations between cord blood levels and specific types of minor anomalies or

any major anomalies. There are also no reliable data pointing to adverse effects in human offspring following lead exposure to fathers.

BPA has concluded that the current collective human data regarding lead's effects on reproduction on in utero development are insufficient for accurate estimation of exposure-effect or no-effect levels (EPA 1984d). In the absence of sufficient data, it has been suggested that it would be prudent to avoid lead exposures resulting in PbB levels exceeding 25 to 30 ug/dl to pregnant women and women of child-bearing age in general. This conclusion was based on the known equilibration between maternal and fetal blood lead concentrations and growing evidence of deleterious effects in young children as PbB levels approach 25 to 30 ug/dl. Industrial lead exposure of men with PbB levels of 40 to 50 ug/dl also appears to result in altered testicular function.

# Carcinogenicity

Several studies have reported renal tumors in Vistar rats following ingestion of high doses of a lead salt (lead acetate). Lead subacetate (another lead salt) has produced benign tumors (renal carcinomas or adenomas) in Swiss mice and seveal strains of rats, but not golden hamsters. Glimomas (CNS tumors) were also observed in many of these studies.

There have been a number of epidemiological studies which have assessed the mortality experience of lead-exposed workers. In some of the studies, no excess cancer mortality was observed. In one study, non-statistically significant excess cancer mortality of the respiratory system and cancer of the digestive organs and peritoneum was reported which on evaluation by other statistical techniques by another investigator was reported to achieve statistical significance. Another study has reported increased mortality from renal cancer among a group of lead smelting workers. However, this excess mortality, based on only six cases, did not achieve statistical significance. On review of all of these studies, EPA concluded that the absence of good lead exposure documentation made it difficult to assess the contribution of lead to the observed results.

The International Agency for Research on Cancer (IARC) has classified lead in Group 3, inadequate evidence for carcinogenicity in humans,

sufficient evidence for carcinogenicity in animals (for some salts). EPA has classified lead in category B<sub>2</sub> (sufficient evidence in animals, insufficient evidence in humans) according to the Agency's Guidelines for Carcinogen Risk Assessment (EPA, 1986b). However, the Agency noted that the doses inducing kidney tumors in positive rat studies were beyond the human lethal dose, and several epidemiological studies have not demonstrated an association between lead exposure and elevated cancer occupationally exposed workers. Consequently, EPA has recently proposed to set an MCLG in drinking water based on noncarcinogenic endpoints (EPA 1985c).

### Drinking Vater Standards

The current EPA and drinking water MCL for lead is 50 ug/L. This limit was designed to limit PbB levels in 99.5% of the population to below 30 ug/dl.

NAS (1977) has stated that the current MCL, in view of other environmental sources of exposure, may not provide a sufficient margin of safety, particularly for fetuses and young children.

EPA, in agreement with this assessment, has recently taken the first step in lowering the MCL by issuing a proposed MCLG of 20 ug/L. This level was derived based on a target PbB level of 15 ug/dl for protecting children and infants, using a conversion factor of 6.25 to translate PbB to lead in drinking water (assuming a consumption of 1 liter of water per day) and an uncertainty factor of 5 (EPA 1985c). After finalization of the MCLG, EPA would then factor in other data, such as technological feasibility, to establish a revised MCL.

ceiving HCB orally reported both fetotoxicity and teratogenicity (EFA 1985g). The effects noted in these studies included cleft palate, reduced fetal viability, reduced neonatal weight gain and reduced relative fetal weight (EPA 1987g).

## Carcinogenicity and Mutagenicity

Lifetime animal carcinogenicity studies have revealed that HCB elicited statistically significant increased tumor incidences in rats, mice, and hamsters. Based on these data, EPA has placed HCB in its carcinogenicity category B<sub>2</sub> as a probable human carcinogen.

# Drinking Vater Standards and Criteria

EPA has not developed a drinking water standard for HCB. The EPA one-day and 10-day and longer health advisories (HAs) for a 10-kg child are each 50 ug/L. The longer-term HA is 175 ug/L for a 70-kg adult. The EPA reference concentration for a potential carcinogen risk of  $1 \times 10^{-6}$  is 0.02 ug/L.

## Noncarcinogenic Effects

When toxicity information is considered for noncarcinogenic effects of substances, the data are evaluated based on their dose-related response characteristics and the establishment of an exposure level below which no adverse effects are observed. Historically, the observed threshold or no-effect level for lead-induced toxic effects has continued to decline as more sophisicated experimental and clinical measures are employed to detect more subtle effects. These include alterations in physiological functions at blood lead (PbB) levels below the currently accepted maximum safe level for exposure to children, a segment of the population currently regarded to be at highest risk of lead-induced effects (EPA 1985c, ATSDR, 1987j).

The most serious effects associated with markedly elevated PbB levels are severe neurotoxic effects that include irreversible brain damage. For most adults, such damage does not occur until PbB levels exceed 100 to 120 micrograms per deciliter (ug/dl). At these PbB levels, severe gastrointestinal symptoms and effects on several other organ systems are often found. Precise thresholds for occurrence of overt neurological and gastrointestinal signs and symptoms of lead exposure in cases of subencenpthalopathic lead intoxication have yet to be established, but such effects have been observed in chronically exposed adult lead workers at PbB levels as low as 40 to 50 ug/dl.

Toward the lower range of PbB levels associated with overt lead intoxication, less severe but important signs of impairment in normal physiological functioning in several organ systems are evident among apparently asymptomatic lead-exposed adults (EPA 1985c). These include:

- o Slowed nerve conduction velocities indicative of peripheral nerve dysfunction (at PbB levels as low as 30 to 40 ug/dl);
- o Altered testicular function (at PbB levels of 40 to 50 ug/dl); and
- o Reduced hemoglobin production (at approximately 50 ug/dl).

nausea, and general weakness. Effects on the liver include necrosis and epithelial cell damage, and on the kidney, degeneration of the proximal tubule (EPA 1985b)

## Carcinogenicity and Mutagenicity

In a NCI bioassay, EDC administered by gavage was shown to increase the incidence of tumors in both mice and rats. Based upon these data, EPA has classified EDC according to weight-of-evidence carcinogenicity criteria in Group B<sub>2</sub> - probable human carcinogen (EPA 1987a).

EDC has shown to induce gene mutations in bacteria, plants,

Drosophilia melanogaster, and cultured Chinese hamster ovary cells (EPA
1985i). In addition, EDC has been reported to cause meiotic chromosomal
disjunction in Drosophilia. Based upon these data, EPA has determined
based upon weight-of-evidence criteria that EDC is a mutagen that may
have the potential for causing adverse effects in humans (EPA 1985i).

## Drinking Water Standards and Criteria

Standards. In the first stage of a procedure to establish an enforceable MCL for EDC in drinking water, EPA has established a MCLG of 0. This MCLG was predicated on the EPA conclusion that no exposure to a "probable human carcinogen" is acceptable. Based upon considerations of analytical feasibility and feasibility of control, EPA has issued a MCL for EDC of 5 ug/L.

Criteria. In the absence of suitable data, EPA has not developed 1-day or 10-day HAs for EDC. EPA has, however, developed a longer-term HA based upon a NOAEL reported in a rat inhalation study. Based upon a NOAEL of 405 mg/m<sup>3</sup>, an uncertainty factor of 100 and various intake assumptions and physiological parameters, EPA derived longer-terms HAs of 740 ug/L (10-kg child) and 2,600 ug/L (70-kg adult) (EPA 1985d). Because EDC was judged to be a probable human carcinogen, EPA did not develop a lifetime HA for noncarcinogenic effects.

EPA has not developed an ambient water quality criterion for EDC for the protection of human health.

#### HEXACHLOROBENZENE (HCB)

### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of hexachlorobenzene (CAS No. 118-74-1) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	285
Water Solubility (mg/L at 25°C)	0.006
Vapor Pressure (mmHg at 25°C)	1.1 x 10 <sup>-5</sup>
Henry's Law Constant (atm-m /mole)	$6.8 \times 10^{-4}$
Log K <sub>OW</sub>	5.23
K <sub>oc</sub>	3900
BCF	8690

Hexachlorobenzene (HCB) has a low water solubility, a high  $\log K_{\rm OW}$ , and relatively high  $K_{\rm OC}$ , indicating that the chemical will be strongly adsorbed in soil or sediments following discharge to surface water. The low vapor pressure and Henry's law constant indicate that votilization will not be a major transport mechanism from either soils or surface water. In addition, based on the  $\log K_{\rm OW}$  and high  $K_{\rm OC}$ , significant leaching from source soils is not anticipated.

HCB is expected to be slowly degraded by soil or sediment microorganisms. HCB is expected to significantly bioconcentrate in aquatic life with BCFs ranging from 5,500 to 44,437 in vertebrates (EPA 1985g).

### Noncarcinogenic Effects

Porphyria cutonea tardea (PCT) has been demonstrated in Turkish citizens who accidentally consumed bread contaminated with HCB. PCT-associated symptoms observed included skin lesions and hyperpigmentation. In addition, HCB caused neurotoxicity, liver damage, arthritic conditions, and in children, reduced growth. Studies in rodents re-

#### 1.2-DICHLOROETHANE (ETHYLENE DICHLORIDE OR EDC)

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,2-dichloroethane (CAS No. 107-06-2) are summarized below (EPA 1986a).

Molecular Weight (g/mole)	99
Water Solubility (mg/L at 25°C)	8.5 x 10 <sup>-3</sup>
Vapor Pressure (mmHg at 25°C)	64
Henry's Law Constant (atm-m /mole)	$9.8 \times 10^{-4}$
Log Kow	1.48
K <sub>oc</sub>	14
BCF	1.2

A half-life of 1,2-dichloroethane from soil could not be located in the available literature; however, based on its moderate vapor pressure, evaporation is expected to be the predominant loss mechanism from the top layer of soil. In subsurface soil, biochemical and chemical biodegradation are expected to be slow. Therefore, based on its low  $K_{\rm oc}$ , 1,2-dichloroethane is expected to leach and be transported to groundwater. Once in groundwater, the low  $K_{\rm oc}$  indicates 1,2-dichloroethane will be mildly adorbed to soil particulate and will be subject to low retardation relative to the groundwater flow. In addition, its high Henry's Law Constant indicates evaporation from surface water is an important fate mechanism. Based on its low BCF, 1,2-dichloroethane is not expected to bioconcentrate in aquatic life.

## Noncarcinogenic Effects

At relatively high doses, 1,2-dichloroethane (EDC) produces CNS depression as well as injury to the liver, kidney, and adrenals. Symptoms of CNS depression typically include headache, dizziness,

#### **DICHLOROBENZENES**

### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,2-dichlorobenzene (CAS No. 95-50-1); 1-3-dichlorobenzene (CAS No. 541-73-1); and 1,4-dichlorobenzene (CAS No. 106-16-7) are presented below.

Compound	1,2-DCB	1,3-DCB	1,4-DCB
Molecular Weight (g/mole)	147	147	147
Water Solubility (mg/L at 25°C)	100	123	79
Vapor Pressure (mmHg at 25°C)	1	2.3	1.2
Henry's Law Constant (atm-m³/mole)	$1.9 \times 10^{-3}$	$3.6 \times 10^{-3}$	$2.9 \times 10^{-3}$
Log Kow	3.6	3.6	3.6
K <sub>oc</sub>	1700	1700	1700
BCP	5	5	5

The log  $K_{ov}$ , high  $K_{oc}$ , and low vapor pressure indicate that adsorption onto soils is the major fate process of DCB isomers in soils. Similarly, adsorption to these media will dominate transport and fate of the isomers discharged into aquatic media.

The log K<sub>ow</sub>s suggest that DCB isomers will bioaccumulate. Biodegradation is not likely to be a significant degradation pathway for DCB isomers, based upon data which indicate that chlorobenzene is resistent to biodegradation and that resistance increases with increasing chlorination of the benzene ring (ATSDR 1987i).

## Noncarcinogenic Effects

The principal toxic effects of o-dichlorobenzene (1,2-dichlorobenzene or o-DCB) and p-dichlorobenzene (1,4-dichlorobenzene or p-DCB) in humans and other animals from acute and longer-term exposures include

CNS depression; blood dyscrasias; and lung, kidney, and liver damage. Similar data are not available for m-dichlorobenzene (1,3-dichlorobenzene or m-DCB). However, based upon short-term assays, EPA has determined that short-term assessments developed for o-DCB should apply to m-DCB.

### Carcinogenicity and Mutagenicity

The few studies available on the carcinogenic potential of the DCBs have been negative or insufficient to clearly classify any DCB isomer as carcinogenic. Preliminary results of an NTP gavage bioassay indicate that o-DCB was not carcinogenic under the conditions of the experiment. Pending receipt of the final NTP report for o-DCB, EPA has categorized o-DCB according to Agency weight-of-evidence carcinogenicity criteria in Group D, not classifiable as to human carcinogenicity (EPA 1987d). EPA has classified p-DCB in group C, limited evidence of carcinogenicity in animal studies (EPA 1987a).

In general, DCBs have shown little or no mutagenic activity in a range of bacterial systems. However, several studies with mold and plant cultures treated with DCBs have reported mutations and chromosomal alterations (EPA 1987d).

#### Drinking Water Standards and Criteria

EPA has established a final drinking water MCL for p-dichlorobenzene of 75 ug/l (BPA 1987a). This MCL was based on a reference dose of 0.1 mg/kg/day, an uncertainty factor of 10, allocation of 20% of total human intake from all exposure sources to drinking water and various intake and physiological assumptions. EPA is also in the process of establishing an enforceable MCL for o-DCB and p-DCB, but not m-DCB. As a first step in the process, EPA has issued a proposed MCLG for o-DCB based upon a NOAEL reported in a subchronic gavage study in mice and rats. Based upon a NOAEL of 125 mg/kg/day, an uncertainty factor of 100, and the same assumptions as for p-DCB, EPA has derived a proposed MCLG for o-DCB of 620 ug/L.

In the absence of sufficient data, EPA has not developed, and is not in the process of developing, a drinking water standard for m-DCB.

### Environmental Chemistry and Fate

The relevant physical and chemical properties of chlorophenol (CP-CAS No. 95-57-8) and 2,4-dichlorophenol (DCP-CAS No. 12-83-2) are summarized in the Table below (Arthur D. Little, Inc. 1982).

Compound	2-chlorophenol	2,4-dichlorophenol
Molecular Weight (g/mole)	129	163
Water Solubility (mg/L at 25°C)	28,500 (20°C)	4,600 (20°C)
Vapor Pressure (mmHg at 25°C)	2.2	0.11
Henry's Law Constant (atm-m³/mole)	$1.3 \times 10^{-3}$	$5.0 \times 10^{-6}$
Log K <sub>ow</sub>	2.17	2.75
K <sub>oc</sub>	No data	380
BCF	214	130

The above data show that both CP and DCP have high water solubilities and low vapor pressures. Additionally, using the  $K_{\rm oc}$  of DCP, the two chlorophenols have moderate  $K_{\rm oc}$ s. These three values indicate that both volatilization from surface soils and infiltration to groundwater are important transport pathways. The high Henry's law constant, along with the high water solubility and moderate  $K_{\rm oc}$ , indicates that volatilization is an important transport pathway from surface water. However, its low Henry's law constant indicates that both volatilization and partitioning to sediments are important pathways in surface water.

Biodegradation in soils and surface vater are significant transformation processes (Aurthur D. Little, Inc., 1982). No data were found concerning biodegradation in groundwater.

Bioconcentration factors (BCFs) indicate moderate bioconcentration in aquatic species.

### Noncarcinogenic Effects

In rodents subjected to acute high oral exposures, CP and DCP elicited respiratory excitation, clonic convulsions, and/or motor weakness (hypotonia). Few long-term animal studies are available. Those few that are available show reduction in hematological parameters or enzyme changes. No data were found concerning effects of CP and DCP on the developing embryo or the reproductive process.

### Carcinogenicity and Mutagenicity

No data were found concerning the potential carcinogenicity of CP or DCP by the oral route. However, CP and DCP were reported to promote tumors following a single dermal application of dimethylbenzanthracene on mouse skin (Boutvell and Bosch, 1959).

CP has been shown to be mutagenic in Sprague Davley rats fed 130 mg/kg CP every other day for one week (Chung 1978). In these rats a six-fold increased incidence of chromatid deletions (12% vs. 2% in controls) was seen. Complete inhibition of mitosis was reported in bone marrow cells taken from treated rats.

DCP, tested using the Ames <u>Salmonella</u> microsomal assay, was reported as not mutagenic with and without activation.

Consequently, whereas CP can be classified as mutagenic, there are insufficient data to evaluate the mutagenicity of DCP.

#### Drinking Water Standards

EPA has not issued any drinking water standards, health advisories, or other criteria for CP or DCP.